

A decorative border in a Greek key (meander) pattern, rendered in a dark ink or dye. It runs along the edges of the cover, with the corners being mitered to follow the shape of the book's spine and corners.

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Nos. 27168 - 27658

07/58
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~~27929~~ - 92

Descriptive passages photographed 1974
B. Decker

Collection and Field Note Book

No. 19

(March 21, 1947 - June 3, 1947)

1947 Cinchona Expedition

(27168 --- 27658)

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Items on a 99 map 1:1000000
to be checked

on N.C. 16 + 17 are two
provinces in Costa Rica
both called Puntarenas

on N.C. 16 the boundary
bet. Prov. Heredia and Prov. Alajuela
as it crosses saddle bet.
Volcan Poas + V. Barba is
marked as a straight n.s. line,
but is said actually
to follow road.

on N.C. 17 Cerro Cambutal
is 4750 feet.

Cerro Tuto should be Cerro Tute

Cerro Gaita + peaks
around El Valle run
up to 1200 m.

Paul Allen

79° 35'
99° 15'
5 mi. w.
summit

79° 40'
90° 4'
3 mi. w.
summit
Malden
Dam Rd.

79° 40'
90° 45'
by rd.

Notes

- No blanks for Mexico
see 27168(19) and book 22
- general Guatemala blank missing
(12A)
- what about missing nos? (see cards in book 19,
and printed marks)
27216 p. 52 to finish Guatemala
- Start with 27290 (p. 70, 19) and complete Costa Rica
- ✓ Panama p. 104 (19) localities should be checked
on 1975 map (gamboos sheet)
- ✓ Colombia p. 106 (34)
- ✓ Ecuador p. 118-125 no blanks?
p. 124 - OK

- What are red L in books 20? ^{some specimens left in}
^{ino, send them}
^{labels}
- ~~How~~ How about plants retrieved in 1957??
- Where are Cuzco blanks (for books 20, 21?)
- Book 21, what does Cuz (see p. 4) mean? ^{specimen left in Cuzco, send label?}
- Blanks for 27659 - ? 28028 ? missing
27673 - ? ~~28098 - 28105~~
27739 - 43? 28195 - 97?
~~27779 - 92?~~ 28251 - 28322?
~~27809 - 50?~~
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Boh 21

plants missing? record 1.128

blank for 28323-28409? 28458-92 blanks were
printed wrong

28712-28736? missing

all Augco etc, models made

Boh 22

OK spec. Brazil

F. R. Fosberg
Collection book #19

Nos. 27168 - 27658

Collection nos:

27168 - 27658

27168



Miniature
Account Book
No. S 136

UNIT RULED

Journal
Cash Book
Record (29 Lines) .
Ledger, Double Entry
Ledger, Single Entry

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Smithsonian Institution,
Washington, D.C.
or to nearest U.S. Consulate
or embassy.

1947 Cinchona Expedition

Left Washington at 8:00 PM.

March 21 via B & O.

Illinois 1947

March 22 - crossing
southern Illinois via B. & O.
R.R. bet. Vincennes & Lumberton
(from letter to the Evans) -
"just a little while
ago we crossed the Wabash
River. It is quite a
majestic stream this
far down. And there really
are sycamores. Here the
country is rather flat,
with corn-fields, but
not too flat or too con-
tinuous corn-fields. There
are patches of woods, wooded
bottoms, and wooded
knolls - all deciduous
woods here. Back in
Ohio and Indiana were
scattered junipers and
even pines. Surprisingly,
though it is sunny and
warm there is no sign
of spring yet. Not a
leaf has appeared, nor
a flower. Last year
when I came across
here about a week
later red-buds and

1947 Illinois

many other things were in full bloom. This year is really late. It is queer to see such sunlight on such a completely leafless landscape (except for dry oak and beech leaves still persisting). The fields of *Andropogon* add a touch of rich pinkish tan here and there. Big oaks are scattered in the fields. Thickets are scattered along the fences and in depressions. Some parts of the middle West might be quite pleasant to live in."

Texas

March 23 - Missouri Pacific line from St. Louis to Laredo via Palestine, Austin & San Antonio.

Before reaching Palestine is a red soil country ~~to~~ dominated by pines of several sp. Deciduous areas down this far show little or no signs of spring except noticeable swelling of buds. South of Palestina almost immediately spring was evident. Trees were beginning to leaf out. Several wild-flowers were in bloom.

Near Taylor, northeast of Austin, forests of oaks, largely evergreen oaks, but mixed with deciduous, and juniper became very evident. *Tillandsia festoons* occasional trees. This continued to Austin. *Melia azedarach* is common

along roads and near houses. *Cercis* is occasional and in full bloom. *Prunus americana* (?) is common in the thickets.

Crossed Rio Grande to Nuevo Laredo just before midnight Mar. 23.

1947 Mexico - Nuevo Leon

argemone alba very common in disturbed fields.

Mar. 24 - near Monterrey flats and valley floors are covered by a scrubby thorn forest with much *Prosopis glandulosa*, *Acacia farnesiana*, *Condalia* (?), *Ceanothus* (?) (large dense tree with white fls.), *Yucca* (an arborescent form with rather long drooping ~~stems~~ infls.), *Opuntia phaeacantha* (rel. aff.), *Croton* (?), and various other things. *Agave americana*

The mountains are of sedimentary beds, often very much tilted, bare, dry, with a thin desert vegetation. No coniferous or mesophytic vegetation seen from train.

Some parts of the valley floor above Monterrey badly eaten by large herds of goats.

Hunnemannia mexicana local in valley floor near rr. track well

above Monterey.

near 1st small siding
up valley from Mont.
enter extensive flats
of *Larrea* with
several *Opuntia* ^(O. microdasys?) species
+ small *Prosopis* bushes
+ tiny agave sp.

Above this the valley narrows
abruptly and goes thru a
small canyon with a
stream, *Salix* sp. etc.

Then opens out into
extensive desert flats again.

With even slight increase
in elevation the composition
changes rapidly.

Around settlements
Eucalyptus, *Casuarina*,
Tamarix, *Nicotiana glauca*.

Various additional cacti
(*Cylindropuntia*, *Echinocereus*, etc.)
come in with altitude, as
do many other shrubs.

At the foot of the
mountains cacti are
abundant so the whole
landscape is a veritable
cactus-garden.

Further up, the
canyon bottoms are
cultivated - gardens
and patches of grain.
The canyon walls are,
in places so covered
by a small agave, as
to look ~~to~~ from a distance
like grass. Still further
up, the canyon bottom
is filled with *Salix*,
along a small stream.

Around Saltillo the
flat valley bottoms
are cultivated. *Populus*
is the characteristic
tree.

In Saltillo *Casuarina*,
Cupressus (2 sp.), *Ficus carica*,
Fraxinus, and various
other things are ~~not~~ cultivated.
The *Casuarinas* are all
dead after reaching 1-1.5 dm.
diam.

Above Saltillo are
vineyards, also walnut
groves, but also much

overgrazed and eroded land - some lake bed formation very seriously cut into straight sided barrancas. Stock are not abundant because so little is left to eat.

Barley is raised in flat places where irrigation is possible.

Some miles above are extensive flats with Larrea, great patches of the same tiny Agave, and unbranched arborescent yucca 1-3 m. tall. Quite a few cacti. A number of cacti incl. an Echinocactus with bright red spines. One oasis of Populus and irrigated fields toward the head of this.

Above this the vegetation changes as the r. goes up a narrow valley to Carneros. Nolina.

Larrea still common everywhere, esp. on slopes.

Juniperus, Berberis and Ephedra become common. The small agave and yucca are still dominant, cacti abundant and of various kinds.

Nolina at some spots dominates. Above this the valley broadens again into a lake bed then narrows among rounded hills.

Some cultivation here and there, but too little water. Not obvious at this season what is being grown.

The yuccas almost universally have the leaves cut off - the distal third or half. No evidence as to what does it; but almost universal. At one place people were seen harvesting leaves of the small agave but not apparent what for.

~~Larrea~~

Above this, on the slope, around another large lake bed, in Larrea-Yucca-Nolina-Opuntia-grass vegetation another huge sp. of Echinocactus like *E. grusonii*, seen, along with the red-spined cespitose one seen before. Here also a low matted straw-spined *Opuntia* common. Another rather short-but broad-leaved *Agave* here.

Further along the R.R. crossed a large lake bed. The ^{and almost flat part} slopes are dominantly Larrea, but the flat is dominated by a large *Opuntia* like *O. prolifera* - ~~at~~ this is abundant also up into the Larrea surrounding this.

On the plateau are enormous flats of Larrea, here and there dominated by forests of branching

arborescent yuccas. No noticeable admixture of *Flourensia*. Depressions here and there with different vegetation but none close enough to see what it is. General vegetation composition very simple here. Higher parts with a tall *Eylindropuntia* common.

South of Vanegas Jct. is an extensive flat of mixed *Atriplex* and Larrea. ~~Much~~ Further south, in more or less the same sort of country *Echinus molle* is scattered over the flats. It is not apparent whether or not it is native, as not far away at Catorce it also grows around houses.

South of Wadley Sta. the W. slope of the mts. to the east appear covered by piñon forest, but too far away to be sure.

Not far north of San Luis Potosí a dense candalaria-like *Cereus* becomes common. Various *Opuntias* and locally *Agave* are co-dominant with *Larrea*. Locally *Prosopis* is dominant or even exclusive.

Just a little further on a *Cereus* (*Lophocereus*?) becomes common, but especially around village where it is used as a living fence.

Mar. 25 - from 100 to 40 km.

n. of Mexico City

Plateau land with gray soil - Plantations of perhaps 2 sp. of gray agaves. Flats usually cultivated. *Schinus molle* is perhaps the most common tree - growing spontaneously everywhere - many large old trees. *Prosopis* also common - flowering abundantly. *Opuntia* of megacantha type also abundant.

In villages *Eucalyptus*, *Cupressus* (gray sp.), *Salix*, etc. common, as well as *Schinus*, *Prosopis*, *Opuntia*, etc. *Populus*.

About 100 km. n. The slopes are covered abundantly with a candalaria-like *Cereus*.

As Mexico City is approached the flats are more and more cultivated, villages

more common.

The slopes are very universally over-grazed. The surface layers of soil are long since gone. At this season the grass is very dry and eaten to the ground.

Close to Mexico, the Agave plantations even climb the slopes.

Phoenix canariensis
Platanus sp.
Magnolia grandiflora
Ficus carica

Mar. 25-27 Mexico City

Plants cultivated in parks, gardens, along streets, etc.

Fraxinus sp. dominant
Washingtonia filifera
Ligustrum (evergreen)
Phoenix dactylifera
Chamaecyparis
Plumbago auriculata
Punica granatum
Nerium ~~oleander~~ indicum
Eucalyptus globulus
Eucalyptus sp.
Cedrus libani
Dracaena draco
Cupressus sempervirens
Cupressus benthamiana?
Chamaecyparis sp.
Poa annua (lawn)
Bellis perennis (in lawn)
Schinus molle
Hedera helix
Pelargonium (ivy geranium)
Jasminum (yellow)
Bougainvillea glabra
Cotoneaster pannosa

March 28 - Trip by rail from Mexico to Uruapan (casual observations from train window).

At Dos Rios (2645 m.) the forest is Pine-oak. Above this *Cupressus* sp. and *Pseudotsuga* ^{albie} (?) sp. become important and even dominant.

Farming here is carried out on steep slopes, and is good contour farming, semi-terraced, with contour rows of agave.

A high meadow ~~is~~ is at Salazar, surrounded by Pinus-*Pseudotsuga* ^{albies (mostly albies)} forest (photos). ^{Ocolluacan} beginning at ~~Ocolluacan~~

From here on, the country is a series of lake-beds, probably of volcanic ash, with mountains, largely dead volcanic cones, between them.

The railroad goes from one to another of these. The largest is that where

Toluca is located.

They are much like the Sabana de Bogotá in Colombia. They are essentially open, either pastured or cultivated, where pastured usually seriously overgrazed, sometimes even miniature bad-lands topography.

Along shallow ravines with water or wet ground, *Salix* sp. is common along these and around villages.

Below Tepenanga the valley becomes rocky (lava), and *Opuntia* (*Platyopuntia*) spp.

become dominant, with a small red fld. *Erythrina* like *E. herbacea* conspicuous.

Maravatia (2013 m.) is in another great lake bed, this one green and cultivated. Below Maravatia the plain becomes dry and supports a sparse woodland of *Acacia*, *Prosopis* & *Opuntia*. (End of roll #1, 64 w. Panatomic)

1947 Mexico

Below Acambara there is a sparse woodland of arborescent *Opuntia*, another unidentified base tree, *Bursera* sp., & *Prosopis*.

From here on there is a curious habit of string fodder in *Prosopis* trees, probably to keep it out of reach of animals.

At Huingo is Laguna de Cuixtío, a large lake surrounded in most parts by broad *Distichlis* flats or *Scirpus lacustris* (relaff.) flats, then by luxuriant *Prosopis* forests on the flats. The soil looks alkaline, with white deposits in the cultivated parts. The *Scirpus* was being harvested.

From above Quirio to well below Charo the flat meandering valley bottom is quite luxuriant. Parts are cult. and along streams and sloughs *Taxodium* and *Salix*, as well as *Alnus*, *Fraxinus*, etc. are common. The

Taxodium is especially along the water and is beautifully covered by *Tillandsia usneoides*. The appearance is quite like S.E. U.S. No bees were seen from train. At Charo were a couple of trees of *Salix* of a narrow columnar form, as *S. chilensis* in S.A.

Below Moralia are dry volcanic hills, grassy and over-grazed, with brushy canyons that look as though the flora might be interesting.

Below this the rocky slopes and low hills are dominated by *Yucca*, *Opuntia* & an unidentified tree. The valley floor is very green. Below, oak forest gradually ~~appears~~.

Beyond Patzcuaro are pine-oak or pine forest - very nice tall forest with little undergrowth. Dead volcanoes are numerous.

The season is very dry everywhere, and dusty.

March 29 - Uruapan and vicinity. Surrounding Uruapan is a volcanic plateau, varying from 1600 to 1800 m. alt. liberally sprinkled with small extinct cones. The river Cupatitzis arises in a large spring, practically within the city, called Rodillo del Diablo from a mark like a knee print in the rock. It has cut a large canyon to a depth of 150-200 m. in the plateau. The river is a beautiful abundant stream of water, fed by springs all along. ↗

Canyon below ~~the~~ waterfall.

~~27168~~

27168

Drymaria

rare on rocks in bottom of

Several miles below the city is a beautiful waterfall, called Salto de Sararaena. Here, in addition to the fall of the main river, the amphitheater formed by it is surrounded at the head by a curtain of small falls from a stratum which gushes water.

The plateau is mainly an open forest of at least 2 sp. of *Pinus* (one looking like *P. palustris*, the other glaucous and shorter needles).

The canyon walls are covered by oak forests mixed with other things. The country is very dry at this season. The rains are said to begin in May.

spreading mat, rooting at nodes

March 29 Paracho

This town does a great deal of wood-work-turned articles. The wood used is an Arbutus (called Madroños) which is common in the pine forest bet. here and Uruapan. The ~~wood~~ wood, in short logs about 4 dm. long, is boiled in water before turning so it won't crack. It is dull pinkish and takes a good polish.

The trip from Uruapan to Volcan Parícutin takes about 1½ hours by car. First part over paved highway, then a rather poor branch dirt road. The general ~~can~~ vegetation is pine forest, with clearing and meadows here and there. The country is dotted with extinct cones. After a time (just before "Las Cruces" camp) areas of ash appear. Even

near Uruapan there is a thin blue-gray coating of ash all over the ground. But here it is so thick that on the flat places it has killed all herbaceous vegetation. The pines and such shrubs as oaks, Crataegus, Fencis, etc. are not evidently injured. From here on ash becomes more abundant.

The ~~gas~~ taxi-driver (Sam Ruiz - good man, speaks English, educated in Nogales, Ariz. with "titio de auto y buses" Parícutin.) told me that the Tarasco Indians had planted wheat and maize in this ash, with curious results. The maize grew, but produced no ears. The wheat yielded more than a normal crop.

The road ends near the edge of an extensive lava flow, several miles

from the volcano. This flow covers a great extent of territory, and destroyed 2 villages, Panicutin and Santa Rosa (?). The church tower of the latter sticks up in the middle of the flow. 4000+ people were made homeless and some killed. All of the lava seen is aa. The moving flow seen at about ~~1/2~~ 1 1/2 miles from the cone moved imperceptibly the evidence being a continual breaking of the rocks at the edges, crumbling off, the heat in the vicinity, and many glowing places at night. The flows seem to come from the base or even somewhat away from the base of the cone. On the north and west sides, at least the vicinity of the cone is completely covered by the flows. Several hills in their path have had

their trees killed, the completeness varying with distance from the cone. These hills are deeply covered with ash, which may be what killed the trees. The last plants to drop out are Crataegus, Senecio and a large bunch grass - in the order named - the grass persisting on some slopes away from the cone ~~or~~ closer than anything else. The skeletons of the trees are everywhere where the ground is not covered by lava.

At a distance from the cone, trees are still alive quite close to the edges of the flows.

There is complete devastation over an area of a number of square miles. The lava seems, on an average 6 m. or more deep, and

it is hard to tell how deep the ash is, but in one place a gully was cut about 2.5 m. into it.

The volcano sends forth continual explosions with great clouds of ash, occasional showers of rocks, which either fall back into the crater or roll down the slopes of the cone. The variation in intensity is marked, but ash seems to be continually sent forth. How such continuous energy and such enormous quantities of material can be emitted over such a period of time is not evident. At the present time the cone is comparable in size with about the average of those around about. It is not ~~erupting~~ erupting as intensely as formerly, but there is still plenty of activity.

Mar. 31 - Trip by highway from Uruapan to Mexico.

Crosses four main high ridges, to the south of the railroad. One is just about Uruapan. Here the forest is Pinus, ~~and~~ Arbutus, with Quercus, with pine dominant.

Bet. Morelia and C. Hidalgo is a great highland, with pines and firs.

The general dryness is less marked here, and many things are in flower - Fuchsia, Lobelia, etc.

This would repay exploration.

The highland ^(bet. Zimacuaro & Toluca) west of the Toluca plain is similar but not so high or luxuriantly forested, at least where the road crosses it.

The one just west of Mexico has extensive fir forests, almost pure.

~~March~~ April 1 - Trip by rail (Ferrocarriles Mexicanos) from Mexico City to Vera Cruz. This route gives a fine transect of eastern Mexico.

North of Mexico City the fact that El Valle ~~old~~ Mexico is an old lake bed is obvious. Here is an extensive marshy area with ditches and rows of willows. Then is ~~over~~ an enormous flat area largely devoted to sugarcane culture. Enormous areas are on this flat and run slightly up on the bases of the nearly ^{dead} volcanic (?) cones. After a while some of the land is open, but still large areas are devoted to sugarcane production.

Near the edge of the plateau, before Esperanza are pine-oak forests, rather sparse.

Going over the edge beyond Esperanza, the m. skirts along just below the

top of the rim, through a moist region of bushy mixed forest, with pines with peculiarly drooping needles. Great numbers of things in bloom.

As lower altitudes are reached, the region becomes drier, until the bottom of a large valley, at middle altitudes, is quite dry, at this season with little vegetation.

Then another escarpment is reached, and the vegetation is a tropical one. Sugar cane is important at the base. From here the plain extends to the sea. The moist sugar cane region gradually changes to thorn forest (or rainy-green forest). It is mostly bare now. A tree Nopalea is found here.

April 2, - Isthmian R.R.
from Vera Cruz to Suchiate

A of Vera Cruz are sand dunes, then low-lying bushy land that is rather moist - water table close to the surface. This soon turns to palm-savanna or palm-thicket. Several palms become very common, incl. a tall labal. Bromelia sp. common.

With only slight increase in alt. palms become scarcer and a "rainy-green" forest, largely of legumes as Enterolobium, Glorididia etc., broken by cult. patches is dominant. It seems about half leafed out. The abundance & species of palms varies. There are also large stretches of grassland or savanna, where are some stocks. From the number of burned patches I suspect this is maintained by fire. It does not seem

overgrazed. In places palm thickets dominate.

After Guayabo the country becomes a true palm savanna, on high dry ground, dominated by a tall labal. There are some other trees & shrubs, mostly legumes. The grass is dry. There are epiphytic ~~to~~ Cereus (or Cylindropuntia) in the palms.

(end of kodachrome roll #1, here near Piedras Negras) (several photos of palm savanna, etc. bet. Piedras Negras & Madereros, several of river & of Enterolobium at Piedras Negras. & on p.w. roll #3.)

After about Joachin, the palm savanna gives way to a dry forest, in places, largely of Enterolobium, with palm scattered, in places abundant, but with many other things.

Occasional sloughs are covered with *Pistia stratiotes*.

As we approach Tierra Blanca the forest becomes greener and more luxuriant. Along streams it is well developed and of large trees.

After Tierra Blanca this forest, though dense, becomes very broken by clearings and burns. Burning seems to be common practice.

After Papaloapan the forest develops into a thick jungle - probably second growth, tangled with vines and shrubs. Much is cleared.

Near Loma Bonita are fields of pineapples, mostly with maize growing in them.

A large river-bottom just S. of Loma Bonita. Broad bottomland, much of it cleared and grown up to brush, but large

trees along the river and in the uncleared parts. Winding sloughs. White herons. Much of the brush seems to be *Psidium*.

Beyond Arroyo Claro is broken forest - large trees in patches - the open country between having been burned but mostly not ~~so~~ recently, and dominated by a curious sedge - a *Scleria* or *Rynchospora* - with a dense brown panicle. Some of the trees look like oaks but the altimeter only says 300 ft.

Beyond Azueta is tall jungle, very dense in places, and largely palms - thicker ^{about} than anything so far, with enough canopy where it has not been disturbed to make the undergrowth thin.

Around Isla is a vast open plain, partly dominated by the sedge mentioned above, part ~~of~~ planted to well kept pineapple fields. The pineapple plants vary in color from bright blue-gray to reddish yellow, the fields being more or less uniform. There are ponds here and there, with ^{white} herons. Southward it gets more and ~~is~~ more bushy, but in patches. Uncultivated plants have certainly been burned, probably often.

April 3 - bet. Arriaga and Tonala, on the Gulf of Tehuantepec, the coastal lowlands are covered with dry forest, largely *Bursera*. Much is cleared and cultivated.

At Tonala more fruit is to be seen for sale along

The r.r. than anywhere so far in the lowlands. There were pineapples, bananas, mangoes, sapodillas, a smooth, somewhat elongate white fleshed melon with practically no sweetness or flavor, but refreshing, a wrinkled rather large fruited *Spondias* called ~~also~~ "ochoa" and a small yellow tasteless fruit whose identity was not obvious. "nansa" *Bunchosia*?

South east of here the forest becomes true thorn-forest, with *Pithecellobium dulce* dominant at first, then becoming more mixed.

Caesalpinia pulcherrima apparently wild, not common.

This in turn gives way to a dry mixed forest, in places largely palms.

Batis maritima flats and mangrove swamps (poorly developed) line the ocean, protected by spits.

Mar. 3 3 km. n.w. Andres,
bet. Tonala & Pijijicapan, Chiapas

27148

weedy
in thickets along railroad
in dry forest

The lowlands gradually become moister toward the south east, the forest more luxuriant, until beyond Pijijicapan it becomes swampy, with stretches of open marsh filled with *Panicum*, and pools with *Pistia*, inhabited by great flocks of white (and darker) herons. *Triplaris* is an important tree, except in wet places.

The area looks more prosperous. The people healthier and happier. Much fruit offered for sale.

vine, flowers large,
purple within whitish
without (seed sample)

Back of these lowlands is a range of rather high and definitely interesting-looking mountains. They vary in distance from the coast, from quite close to 5 mi. or more, and arise from the coastal plain abruptly.

As we get toward Mapastepec the trees get larger - some *Ficus* being positively immense where the forest is not dense. Gradually a tall lowland forest, with *Tabebuia*, *Cecropia*, *Bursera*, *Ficus*, etc. covered with ardisia and vines develops. It is not a rain forest but is definitely a jungle.

1947 - Mexico

Between Mapastepec and Tapachula bananas are grown commercially for shipment by rail.

Castilla rubber trees are occasional and have been tapped.

Xanthosoma, looking much like the Pacific one, but becoming caulescent is common. Leaf shape extremely variable, inc. basal lobes.

Great areas of cleared swamp with Heliconia and the silver-leaved marantaceae.

In Tapachula is a Piper with oblong leaves and erect spikes, a tree with trunk 15 cm. diam. common along streets, though probably not actually cultivated.

Guatemala 39

~~April~~ April 6 - Finca El Naranjo, south slopes of Volcan Santa Clara, 12 km. s.w. of Lago^{de} Atitlan, Depto. de Suchitepiquez
90° 19' W. 14° 30' N. 1170-1250 m.

Steep slopes here have been cleared for planting of Cinchona. The forest was evidently once quite thick. The soil is good and the drainage good.

In a small patch of young Cinchona was observed a colonial spider - a tremendous mass of webs strung between and enveloping the trees, with thousands of spiders of all sizes. Specimens were collected.

A scale is rather common on the under side of the leaves of Cinchona. It is a thin yellow one. The damage to the Cinchona is not conspicuous. (specimens collected)

27169

*Salvia*cultivated about house as
ornamental.

70

Polygala

weed in open grass around garden

71

Coryza

det. J. Cuatrecasas

weed in Cinchona plantation, open.

72

Cinchona

planted, not shaded

73

*Paspalum*common weed in Cinchona plantation
partial shade.

74

Cinchona

planted, not shaded

75

Borreria laevis (Lam.) Griseb.common weed in Cinchona
plantation, partial shade

76

*Richardia scabra*common weed in Cinchona
plantation, partial shade

77

*Conyza*weed in Cinchona plantation
partial shadelow rounded bush, calyces
deep crimson, corolla
light crimson.roots with wintergreen
odor, flowers white.

heads yellowish.

small tree 4 m. tall,
~~flowers~~ leaves dull,
green with reddish
midrib; flowers somewhat
fragrant, cream-white.
spreading, depressed
clump.small tree 5 m. tall,
leaves dull green,
reddish on petiole, midrib
& veins; flowers cream-
white, somewhat fragrant
flowers whitespreading, flowers
pinkish white.flowers yellow,
heads zygomorphic.

- 27173 *Gram.*
weed in Cinchona plantation,
shaded.
- 79 *Calceolaria*
~~rare~~ weed in Cinchona
plantation, shaded thicket
- 80 *Aeschyn.*
weed in Cinchona plantation
shaded.
- 81 *Diastatis*
weed in Cinchona plantation, shaded
- 82 *Cinchona*
planted, not shaded
- 83 *Euphorbia*
rare weed in Cinchona plantation
- 84 *Cinchona*
planted,
- 85 *Paricoum?*
weed in opening in Cinchona plantation
- 86 *Bomarea*
rare weed in Cinchona plantation
in opening.
- 87 *Centradenia floribunda* Planch var. *floribunda*
(det. Wurdack (1968))
weed on vertical earth
barber in Cinchona plantation.

creeping, forming a thin
mat, panicles erect.

lactiferous, flowers
bright crimson, anthers
blue-black.

flowers white.

fls. lavender.

small tree 5 m. tall, leaves
green; flowers white.
glands white.

small tree 4 m. tall,
leaves subglossy, midrib
reddish.

tufts, culms spreading

flowers white.

leaves purplish beneath,
flowers rose colored.

Apr. 7

- 27188 *Cinchona pubescens* var. *succinura*
cultivated on sunny slope

- 89 *Cinchona pubescens* var.
cultivated on sunny slope

- 90 *Cinchona calisaya*
cult. in plantation, not shaded

- 91 *Cinchona calisaya*
cult. in plantation, not shaded

- 92 *Antigonon leptopus*
rare in bottom of gulch

- 93 *Hoffmannia*
occasional in ^{under-}brush in bottom
of gulch

- 94 *Cinchona* (hybrid)
planted, not shaded

- 95 *Cinchona* (hybrid)
planted, not shaded

stem scarcely 4 sided. scarcely glossy.
seedling 2 m. tall, sterile,
leaves green with red petiole
& midrib; stipules erect.
From Ecuador

growing beside #27189, not
as vigorous.

seedling 2.5 m. tall; leaves
green, glossy, veins strong,
red; stipules divergent
at tips, stiff. stem 4 sided.
From Costa Rica

growing beside #27188, more vigorous.
small tree, ~~5~~ 5 m. tall;
leaves dull, veins red.

small tree 5 m. tall;
leaves ~~dull~~ somewhat
subglossy, veins reddish.
prostrate shrub 1 m.

long, flowers purple.
sparsely branched
straggling shrub; flowers
greenish yellow.

small tree 4 m. tall;
leaves dull, green.

Exp. Pl. #293 G.

small tree, 4 m. tall; leaves
dull, green.

Exp. Pl. #251

P.I. #104267

27194 *Cinchona* (hybrid cal. x succ.?)
cult., not shaded

5 97 *Phyllanthus*
weed along trail

2 98 *Adiantum*
cut bank above trail

6 99 *Lycopodium*
cut bank above trail

27200 *Lobelia*
common in openings on
slopes, and along trails

5 01 *Dioscorea*
twining on small *Cinchona* tree
at edge of planting

Apr. 8

5 02 *Cinchona*
cult., not shaded

5 03 *Cinchona* (hybrid)
cult., not shaded

small tree 5 m. tall, leaves
glossy, turning very red,
branches naked.
Exp. Pl. #H-2492-G

erect, fls. greenish

frond pendent.

erect

erect, sparsely branched,
1.5 m. tall, flowers
orange-red.
vine, twining to right,
floriferous for almost
entire length.

small tree 5 m. tall,
leaves dull; said to
be "succumbra" but possibly
not pure. Infls. ^{on branches} without
leaves when old.

tree 8 m. tall, lvs. rather
dull, dark green; flowers
pale pink (pubescent type, with
strongly recurved lobes), fragrant
but unpleasantly so.
Exp. Pl. #N168.

27204 *Cinchona pubescens* var. *succinula*
planted on commercial scale.

05 *Tournefortia*
along trail in canyon

06 *Cinchona* (hybrid)
cult. not shaded

07 *Cinchona* (hybrid)
cult., not shaded

08 *Cinchona*
cult. not shaded

1

Los Andes, upper part
April 10 - Finca Panamá,
south base of Volcan Atitlán.

Virgin rain forest, the lower
part largely cleared for
coffee plantations. The soil
is largely a sand-like
volcanic ash resulting
from an eruption of V. Atitlán
about 1730. There is a strip

small tree 5 m. tall, sterile.
the typical "succinula" of the
plantations. Leaves dull
satinny above.

shrub 3 m. tall; flowers
green; fruit not mature.

small tree 4 m. tall, leaves
green. (typical of the "hybrids"
that segregate out from "liger" or
seed.) NH 339

tree 6 m. tall, leaves green.

Z 51 G

sterile small tree 4 m. tall,
leaves dull.

the so-called "African succinula".
Exp. Pl. # Z 662 G (quite few veins)

of pine forest running from above
middle altitude on the mountain
down to about 1000 m. that is
said to have come in on ash
after the eruption. There is
no other pine on the ~~the~~ Pacific
slope in Guatemala and this is

said not to have been there before the eruption.

The slopes between 1200 and 1400 m. are being cleared of their virgin forest of tall trees for cinchona plantations.

- 27209 *Acalypha*
weed in hedge near dwelling
- 6 10 *Asplenium*
on mossy rock in stream,
wet by splashing water
- #
- 11 *Asplenium*
in tall wet forest being cleared
on tree trunks, rare

In the afternoon was observed a remarkable congregation of the bird called the "azaguan". These birds flew in, ~~from~~ principally from the south, for some little time, gathering in an enormous whirling column, many hundreds of feet high. This was said to be preparatory to departure for the north, and was said to occur always at the beginning of the rainy season. I did not see them go, but a few minutes later they were gone.

14° 32' N 91° 10' W

1230 m. shrub 2.5 m. tall

1250 m. dark green.

1340 m.

↓

frond leathery

27712

4.

common component of

4.

13

Polypodium

epiphytic on tree trunk in

7

14

8

15

Cestrum

5

16

*Passiflora*parasitic on undetermined
sterile tree in

1

17

epiphytic on tree trunk in

1

18

epiphytic in

1

19

Sloanea

common

4

20

Isol

epiphytic on branches of tall tree

1

21

Isol

epiphytic on branches of tall tree

1

22

Peperomia

common on branches of tall trees

2

23

Hillia

epiphytic in

1346 m
↓tree many m. tall, with
a creamy latex that turns
reddish orange on exposure
to air.

fronds stiff, but weak

tree

tree, fruit fleshy, red
when ripe, longitudin-
ally rugose.

dark green

leaves gray, bracts
coral red, flowers blue-
violet.clump, with abundant
aerial roots, flowers
purplish red.

tree 25 m. tall, fruit rare.

flowers whitish

flowers pale greenish
with reddish center.prostrate, leaves fleshy;
rarely fertile.vine-like, sterile,
sub-fleshy.

- in Cinchona plantation
 27224 *Phyllanthus*
 open clearing
 6 25 *Drymaria cordata* Willd.
 on logs and ground under trees
 2 26 *Cinchona ledgeriana*
 5 27 *Cinchona ledgeriana*
 3 28 *Acalypha*
 weed in.

x 20 Apr. 12 Guatemala City
 det. J. Guatemala

29 *Pinguicula*

cult. in pan of water from
 plants brought in from wild

1380 m

↓

Polygonum-like in appearance.

diffuse; fls. white.

pedicels very sticky, even
 when in flower.

small tree 5 m. tall. lvs. dull.

small tree 4 m. tall, leaves
 dull, flowers white,
 somewhat fragrant.

1250 m

erect shrub 1.5 m. tall,
 leaves purple beneath.

4 April 13 - below Concepcion Pinola
headwaters of Rio Pinola, 7 km. e.s.e.
San Jose Pinola, 23 km. e.s.e. Guatemala
Canyon bottom with rocky
cliffs and brush along
stream margins
partly cultivated 1450m

27230

Calliandra

steep brushy bank

31

open pebbly stream margin

32 Euphorbia

open pebbly stream bank

33 Richardia

open pebbly stream bank

34

common in thickets

35 Quercus

in thicket near stream

36 Senecio thomasi Klatt det. J. Cuatrecasas
occasional in thickets near stream37 Borreria laevis (Lam.) Griseb.
occasional near stream

38

in thicket near stream

39 Arceuthobium

parasitic on small pine tree

40 Acalypha

~~abundant~~ thicket near stream

city, Guatemala.

shrub, stamens
red
flowers purple

glands white

prostrate, flowers white.

shrub 3 m. tall. flowers
dried up. stipules divaricate.
small tree 6 m. tall.erect herb 1-1.5 m. tall,
flowers yellow.
flowers white.tree 6 m. tall, flowers
pale green.
yellow-green

unbranched

- 27241 *Triumfetta*
weed in thicket near stream
- 42 *Drymaria cordata*
grassy spot below spring
- 43
common in thickets
- ~~44 *Senecio*~~
- 44 *Senecio santarosae* Green. det. J. Cuatrecasas
common in thickets
- 45 *Senecio petasites* DC. det. J. Cuatrecasas
common in thickets
- 46 *Cuphea*
talus at base of cliff
- 47 *Dryopteris*
crevices in cliff
- 48 *Blechnum*
top of talus at base of cliff
- 49 *Isachne*
in deep crevice in cliff
- 50 *Desmodium*
in deep crevice in cliff
- 51 *Blechnum occidentale*
in crevices in cliff
- 52 *Cuphea*
top of talus at base of cliff
- 53 *Polypodium*
in old stone wall
- 54 *Peperomia*
in old stone wall

suffrutescent herb 1 m.
tall, flowers yellow.
prostrate.

shrub 3 m. tall,
panicle rose color, ripe
fruit black.

erect herb 1-2 m. tall,
flowers yellow.

erect herb 1-2 m. tall,
flowers yellow
petals maroon

tuft

erect, petals deep purple.

curling up with dryness

more or less prostrate,
fleshy.

1947 Guatemala

- 27258 *Guazuma*
common in thickets
27259 *Acalypha*
occasional in thickets near
stream

- 57
common in thickets on slopes

- 58 *Lantana ^{old maldenii} velutina var. violacea (Ney)* ^{maldenii}
common in edges
of thickets on slopes

Apr. 13 above Concepción Pinula
at head of Rio Pinula, 4 km. e.s.e. San
Jose Pinula, 20 km. e.s.e. Guatemala City
brushy woods and open
earth banks on canyon wall

- 59 *...*
openings in bush in small
draw, moist earth.

- 60 *Fuchsia*
rare in bush

- 61 *Eupl*
occasional in bush

- 62 *Rubus*
common in edges of bush

- 63 *Eupatorium*
common in edge of bush

Guatemala

- shrub 4 m. tall, ^{flowers} fruit
green.
shrub 1.5 m. tall, styles
red.

- shrub 3 m. tall,
flowers greenish, flesh
color

- aromatic shrub 1.5 m.
tall, flowers lavender,
leaves purple.

(700 m.)

- rhizome reddish-green,
lactiferous. flowers green

- scandent tangled shrub
1 m. tall; flowers crimson.
shrub, leaves glaucous
beneath. (possibly = 27270)
liana, no primocanes seen;
flowers pink, fruit black
and sour when ripe.
suffrutescent herb 1 m. tall,
heads white.

- 27264 *Eugenia*
common in bushy woods
- 65 *Bosconia frutescens*
common in bushy woods
- 66
mossy overhanging bank
- 67 *Psychotria(?)*
rare in bushy woods
- 68
rare in brush
- 69 *Pleroma*
rare in brush
- 70 *Eugenia*
common in bushy woods
- 71 *Drosera*
common weed in openings
- 72 *Phytolacca*
occasional in openings
- 73 *Acalypha*
occasional in brush
- 74 *Bouteloua*
occasional on open banks
- 75 *Panicum*
abundant on grassy open banks

- small tree ~~6 m.~~ 6 m. tall,
fruit orange.
- shrub 3 m. tall,
fruiting panicle pendent,
aril of seed red.
- prostrate, pendent,
flowers green mottled
with purple.
- drooping shrub 3 m.
tall, fruit fleshy, white.
- rounded shrub 1.5 m.
tall, flowers greenish white.
- slender shrub 1 m. tall,
flowers whitish.
- small tree, flowers
white; fruit yellow.
- (specimens from two trees;
suffrutescent herb 1 m.
tall, sepals red, petals pink.
- herb 1 m. tall, much branched,
flowers purplish-pinkish-green,
fruits translucent purple.
- slender shrub 1 m. tall,
staminate catkins
yellowish red, styles red.

27216

occasional in brush

5

9

77 Myrsine

occasional in brushy woods

78 Salvia

occasional in brush

79 Acalypha

occasional in brush

April 14

Guatemala City, Guat.

80 Eryngium

common weed in lawns

81 Cupressus

common ornamental

This is the dry season here. Rains begin in May. It is so dry that everything is dusty, grass is all dry, and many plants are not in bloom.

The porous volcanic ash soil is especially dry because of the drainage. The region here is an old lake-bed, filled with ash, cut by straight

Apr. 16 - sent plaq. # of plants, air to Miami. Special post to Bolivia. Not numerical cont. most of plants to here ex. some that are not dry.

shrub 2 m. tall, leaves

glaucous beneath. (-27211?)

small tree 5 m. tall,

fruit immature.

aromatic shrub 1 m. tall,

much branched, flowers

violet.

decid., shrubby, steminate

cylindrical and slightly

red.

scapes spreading to

ascending, heads bluish.

tree 20 m tall

sided "barancas" or ravines.

April 16 - Finca Las Charcas, on Amatitlan road, just at city limits of Guat. Sr. & Sr. Rafael Lind have 120 kinds of Eucalyptus, of which they are actively harvesting 5 for oil. Several are grown for timber.

Seedlings of Kunkoff Cinch. calisaya are very unhappy, too dry. Trees 5-8 ft. tall are completely in fruit like a huge inflorescence. Some leafless.

Apr. 17 The hills bet. Tegucigalpa and el Valle de Jamorano are rocky - apparently sedimentary - purple and green conglomerates, massive shales, sand stones, etc. The land is so eroded that little soil is left. The lower parts are sparse thorn forest. The upper parts are pine^{and oak}, very well developed at higher levels, sparse at lower. The top of the road is over 5000' ~~at~~ in good forest. Mt. Uyuca ^{is} ~~is~~ over 6000' and is covered by a cap of rain forest. The Escuela intends to buy it for a biological preserve.

One of the pines has 4 or 5 needles (usually 5).

An *Acacia* abundant near the lower edge of the pines resembles *A. farnesiana* but with much larger thorns, smaller, more abundant flower heads.

The agricultural school, ~~Escuela~~ Escuela Agrícola Panamericana at el Jamorano, maintained by United Fruit Co., has 3000 acres of land, 1000 of it good valley land. (total investment about \$750,000). Buildings of stone, very attractive, not elaborate. Living quarters comfortable. The architectural style is very simple, designed by Vopenec and his engineer. The buildings are low, on one floor, with tile roof + floor, wood ceiling joists and beams, tile roofs, very little ornamentation - only carved ~~the~~ beams over the entrances. Tile roofs with about 30° slope. The stone is white, rough-cut, flat rectangular.

The climate ~~is~~ has a strong dry season, with drying winds. Many things simply will not thrive (i.e. cinchona, cacao, *Hevea*, etc.). The common ornamental tree is ~~Acacia~~ *Acrocomia mexicana* (?)

April 19 For a few miles south of San Jose the landscape is very gentle, almost a toy landscape, with mostly coffee plantations and their shade trees, with abundant bananas. South of Paraiso, the land becomes much more mountainous, with spectacular gorges and canyons. This continues to the Turrialba region.

4 Apr. 19 - Quebrada la Tonta, Rio Azul, above Santa Cruz, lower slopes of Volcan Turrialba, above Turrialba, Prov. Cartago, side of deep wooded ravine

27282

83 Cinchona

common on

84 Galium hypocarpium occasional on cut banks

85 occasional on

Turrialba itself is in a wide valley.

The climate is, in general, wet. This has been a severely dry year, and yet everything is green in the Turrialba area, though around Cartago the hills present a rather dry appearance.

9° 59' N

83° 45' W

1700 m. (e)

small tree

tree 10 m. tall, 3 dm. thick, flowers white, mostly gone, heavily fragrant.

vine - like, tangled in bushes, fruit orange, fleshy. shrub 3 m. tall.

27286 *Cinchona*
common on

37 *Columnnea*
epiphytic on tree-trunk

38 *Elaeagia*
common on

39 *Fuchsia* ~~indica~~ *Pavonia*
ornamental in yard of
dwelling Det. H.E. F. 1998

✓ as April 19 - Santa Cruz, on Rio
Azul, lower slopes of
Volcan Turrialba, Turrialba
broken woods along stream
in pasture

8 90 *Cinchona pubescens*
occasional in

4 91
occasional in

tree 10 m. tall, 3 dm. thick,
flowers mostly gone, white,
heavily fragrant.

leaves fleshy, flowers
scarlet.

tree 10 m. tall; leaves
stiff, buds without

3 m. tall; flowers
clusters pendent.

small tree 3 m. tall,
2 dm. thick, flowers
white within, flushed
with reddish without,
very fragrant.

leaves glossy above, bullate,
veins red, stipules erect
or slightly divergent.

tree 8 m. tall, latex yellow,
sticky; buds rose colored,
said to persist unopened
for months; fruit rare, immature

972 1/2

100 - 2 1/2

- 27286 *Cinchona*
common on
- 87 *Columnnea*
epiphytic on tree-trunk
- 88 *Elaeagia*
common on
- 89 *Fuchsia* ~~l. ...~~ *l. ...*
ornamental in yard of
dwelling Det. P.E. ... 1972

April 19 - Santa Cruz, on Rio
Azul, lower slopes of
Volcan Turrialba, Turrialba
broken woods along stream
in pasture

- 90 *Cinchona pubescens*
occasional in

91

occasional in

tree 10 m. tall, 3 dm. thick,
flowers mostly gone, white,
heavily fragrant.
leaves fleshy, flowers
scarlet.
tree 10 m. tall; leaves
thin but stiff, buds without
gum.
shrub 3 m. tall; flowers
crimson, clusters pendent.

9°59' N

83°44' W

1435 m. (m)

small tree 3 m. tall,
2 dm. thick, flowers
white within, flushed
with reddish without,
very fragrant.
leaves glossy above, bullate,
veins red. stipules erect
or slightly divergent.

tree 8 m. tall, latex yellow,
sticky; buds rose colored,
said to persist unopened
for months; fruit rare, immature

✓ April 20 - 2 km. n.e. of Paraiso
Prov. Cartago

9° 51' n.

83° 46' w

1520 m. (2)

secondary woods on slope

27292 *Cinchona pubescens* Vahl var.
7 occasional in

✓ April 20 - Finca of Mr. P.H.

Lankester, 1-2 km. n. of

Paraiso, P. Cartago

1325 m. (2)

cultivated in garden

93 *Sambucus*

low swampy place

2 94 *Tournefortia*

low swampy place

95 *Columnnea*

on fallen log.

96 *Hillia chiapensis*

on fallen log

97 *Rhamnus*

in low swampy place

leaf-cutting ants had almost
defoliated this tree.

tree 12 m. tall, 2.5 dm. thick,
bark very bitter; leaves
rather dull on upper surface,
veins reddish; stipules
erect, short,
flowers white within,
reddish white without,
very fragrant. (bark sample)

9° 50' n

83° 53' w

shrub 3 m. tall,

flowers white.

shrub 2 m. tall, flowers
greenish white. (plant
said to have been here before
garden was made.)

flower scarlet; leaves
sub-fleshy.

small shrub 1 m. tall,
flowers white, turning
yellowish. (plant from
nearby hills).

shrub 3.5 m. tall. (said to
have been here before garden.)

27298 *Clerodendrum*

99 *Vaccinium*

growing in lath house

Cerro Buena Vista

April 20 - (Cerro de la Muerte)

Panamanian highway,

Crd. de Talamanca, Cartago - San Jose boundary

open páramo-like summits
of range, with bushy patches

27300 *Hedyotis*

common in more open places

01 *Nertera granadensis*

rare, on open ground

02

occasional, on open ground

shrub 3 m. tall, flowers
blue, anthers blackish. (over-
plant brought from Africa)
~~straggling~~ straggling
shrub, flowers pale
coral with pale greenish
tips.

Lat. 9° 35' N

Long. 83° 45' W.

3125 m.

leaves thick, ^{rather} glossy, white
beneath; flowers white,
purplish without, rather
unpleasantly fragrant.
tightly matted to ground,
leaves stiff, ~~flowers~~ flowers
greenish, berries orange-red.
tufts, panicles purple

- 17703 *Eryngium*
common on open ground
- 04 *Carex*
common on open ground
- 05 *Erigeron* sp. det. J. Cuatrecasas
occasional on talus
- 06 *Alchemilla*
~~occ~~ common on talus
- 07 *Solanum*
occasional on steep slope
- 08 *Carex*
occasional on slopes
- 09 *Phytolacca*
common
- 10 *Lycopodium*
occasional on steep bank
- 11 *Hypericum*
common
- 12 *Hedyotis*
common
- 13 *Hypericum*
common

caespitose;
leaves glossy, rugose,
white beneath, with
yellowish veins, odor strong.
tufts

caespitose; stems
purple, rays white.
caespitose, matted.
flowers green, ovaries
becoming purple in fruit.
elongate herb; flowers
dull purplish.

caespitose, culms
spreading, spikes drooping.
herb, densely branching,
up to 1 m. tall forming
clumps; petioles decurrent
as wings on stem; flowers
pink.
creeping, stiff.

sub-shrub, somewhat
glaucous-green, flowers
bright yellow.

prostrate, forming dense
carpets, leaves glossy.
bush 1-1.5 m. tall; flowers
bright yellow.

27314

Chusquea weberbaueri
common

15

Pernettya
common

16

occasional

17

Bomarea
occasional

18

Jamesonia
common, occurring in large
dense patches

19

Castilleja
common

20

Solanum

21

Senecio multioberius Benth. det. J. Cuatrecasas
common

forming large clumps,
up to 1.5 m. tall; one
clump seen fertile, sterile
and fertile parts of this
specimen from different clumps.
sub-shrub, forming
large clumps; leaves
stiff, white beneath;
flowers white, red;
fruits purplish red when
mature.

stems red; flowers
bright chrome yellow.
short vine twining in bushes;
flowers red tinged with
dull orange.
bracts very erect.

brittle herb up to 1 m. tall;
bracts scarlet; calyces
purple edged with chartreuse
corolla chartreuse above,
orange red beneath.
shrub; ~~that~~ flowers purple.
I brought to me by someone,
herb 1 m. tall, branched;
flowers bright deep
chrome yellow.

- 273 22 *Senecio andicola* Turcz. det. J. Cuatrecasas
 common
 23 *Lycopodium*
 rare on bank
 24 *Acaena*
 occasional
 25 *Blechnum*
 occasional
 26 *Valeriana*
 common
 27 *Senecio oerstedianus* Benth. det. J. Cuatrecasas
 occasional
 28 *Valeriana*
 occasional
 29 *Rubus*
 common
 30 ~~*Alchemilla*~~
 30 *Alchemilla*
 very common
 31 *Stellaria*
 occasional
 32 *Halenia*
 occasional
 33 *Stellaria*
 occasional

rounded densely branched
 shrub 1 m. tall; heads pale
 yellow.

spreading herb, branched
 at base
 acaulescent

caespitose herb, with
 unpleasant odor; flowers
 white within, purple
 without.

erect, 1 m. tall, rays yellow.

flowers purple without,
 white within

young canes glaucous;
 leaves white beneath;
 flowers white; berries
 dark red (but perhaps not mature)
 forming a mat on ground,
 all seen sterile.

prostrate

caespitose, flowers
 greenish yellow.

3000 m.

pendent

27334

Nertera granadensis
abundant on road cut

16

3 ✓

April 21 - Instituto Interamericano
de Agricultura, 5 km. S.W. Heredia

3

35

Urena laciniata Wedd.
small patch in low
ground.

I

4

down
T

April 22 - Atlantic slope
of saddle between Volcan
Barbas and Volcan Poas, near
La Ygreja de Heredia, just below
Vara Blanca 2100 m. l.
roadside thickets and banks

27336

5

Nertera granadensis
vertical cut - bank in sun
common locally

11

37

Rubus glaucus
common in roadside tangles

6

38

Drimys
shrub planted as fence post

pendent; leaves stiff,
strongly crispate; flowers
green; fruit orange-red,
juicy, 2 stones.

9°55' N

83°40' W.

532 m. (m.)

erect unbranched, 1-1.5
m. tall, spines on stem
visciously stinging,
leaves purple beneath.

alajuelo-
Heredia boundary
10°10' N.
84°8' W.

plant densely matted,
leaves stiff; flowers
greenish; fruit translucent
red, juicy, stones 2.
bushes up to 2 m. high,
forming tangles,
stems very glaucous;
flowers white; fruits
large, rather sweet,
good flavored, almost
black when ripe. seeds small.
shrub 3 m. tall. bark pungent
to taste; leaves glaucous beneath; fruit black.

Isle Bonita,
April 22 - ~~Los Angeles~~

n. e. slopes of Poas Volcano

7 km. n. n. w. of Vara Blanca, Prov. Alajuela 1337 m. ca.

dense very wet forest
on slopes, cleared recently,
here and there

27339 Cinchona (Ladenbergia)

27340 (fl.) common locally in forest

41 Cleome

rare, local, this colony
in wet vegetation near
base of waterfall

42 Centropogon

rare, at base of waterfall

43

in undergrowth

10° 12' N
84° 10' W.

tree 10 m. tall 2.5 dm. thick
leaves coriaceous, margin
slightly revolute, dark
green, rather glossy above,
pale beneath, petiole
and midrib ~~slightly~~
reddish. flowers white,
strongly and heavily
fragrant; mostly not
in flower and only very
old fruits

stipules
reddish
when open

herb up to 1 m. tall,
rather succulent,
flowers ^{bright} salmon pink,
fruits purple, terete,
not quite mature.

flowers vermillion, with
yellow constricted orifice
and green lobes.

shrub 2 m. tall, buds
white (note enlarged calyx
lobe).

27344

27345

102

Cinchona pubescens Vahl var.
common in forest, this
tree in open clearing

46

Gonzalagunia
occasional in undergrowth

47

Cinchona pubescens Vahl var.
common

April 23 - Finca Los Ensayos,
1 km. above Buena Vista de
San Carlos, ^{3 km. n.w. Jacano,} Alajuela

1000 m. (e.)

Cleared slopes with
scattered trees and
patches of woods.

48

Cosmibuena ovalis

persisting in clearing

49

Cinchona pubescens Vahl var.
common in woods, this
specimen from tree in clearing

50

Cinchona (*Ladenbergia*)
persisting in clearing

Tree 8 m. tall 2 dm. thick
old leaves red, leaves
rather glossy above, veins
green; very few old fruits.

shrub 2-3 m. tall, arching,
flowers white within,
rose without; fruit
white when ripe (specimens
from 2 bushes, one with
ripe fruit.)

tree; flowers pinkish
within and without
(plant brought by boy).

10° 14' n

84° 25' w.

half dead tree, sprouting
from stump.

tree 8 m. tall, 2 dm. thick,
leaves venulose, sub-glossy
above, rugose-bullate,
turning red in age.
sprouts from old stump,
sterile.

April 13 - slope about
finca Los Ensayos toward
El Zapote, ^{1 km. W. of} ~~Barra Honda~~ ^{Zarcero}
~~de San Carlos~~, Prov. Alajuela 1400m.

27351

Cinchona pubescens Schl. var.
edge of patch of woods,
common.

52

Cephaelis
undergrowth in wet
forest.

The plantation of Mench
& Co. at Los Ensayos is
large, on rather gentle
slopes, appearing
rather dry at this season.
There are about 200
acres planted, in full
sun, mostly ledger,
but some succumbra
and others. There is
considerable disease -
canker and a disease
that attacks from the
tip when the plant
is well grown. They
have suffered much loss

10° 13' N.

84° 24' W.

small tree 3 m. tall,
leaves sub-glossy
above, turning red with
age.

shrub 1.5 m. tall,
bracts red, flowers
whitish.

from both. It seems
possible that the canker
is endemic in the rather
common native *C. pubescens*,
which it attacks but
not fatally. This
is well distributed
in a belt from about
3000' - 4500'. This attacks
both succi. & ledger. A disease
called salmon bark ~~kills~~
attacks succumbra. The
other tip disease only
attacks ledger.

The plantation at Isla Bonita is in a terrifically wet region, 200 inches, well distributed. It is cleared from the virgin forest. The trees of all sorts have not made as much growth as I would have expected. There have been serious losses from canker. This canker is spotty but widespread in its occurrence. The only areas really free from it are old clearings. This leads me to suspect that it is a disease of the common native *C. pubescens* or of some other rubiaceous native plant. In the clearings the sprouts have gradually died.

The native variety of *C. pubescens* here has pinkish flowers (only one cluster of very dried ones seen). It is a tree up to 15 m. tall and 3 dm. thick, in a forest 25-40 m. tall. Thus it is a second story tree, but grows in the virgin forest. Seldom does it reach the canopy. This year there seem to be no fruits. Flowering has scarcely started yet. When cut down it sends up vigorous suckers, but few seedlings appear in clearings. Where it has been allowed to persist in clearings it has a bedraggled appearance, probably due to exposure, or to leaf cutting ants, which are common and very fond of *Linepura*.

✓ ③
+ A. Brenes

Apr. 24 - hills ~~2~~ 3 km.
s. of San Ramón, Prov. Alajuela

wet mossy forest, logged
out and very decadent,
in places weedy 1200 m. e.

Jan
I
27353

occasional

54 Piper

occasional

55 Piper

occasional

56 Costus

common

57 Polypodium

epiphytic on tree trunks

58 Cuscuta infundibulata

common around edges of woods

59 Epidendrum

common, epiphytic on branches

10° 4' N
84° 29' W.

This is the place where, in 1921,
Alberto Brenes first found Cinchona
in Costa Rica. A search, in company
with Brenes, ~~for~~ failed to reveal any
remaining trees.

PLANTS OF COSTA RICA
Prov. de Alajuela

Locality

Det.

hills 2.3 km. south of SAN RAMON
Lat. 10° 4.5' N., Long. 84° 29' W.

Occurrence

occasional

wet mossy or scarcely moist forest, logged out and
decadent, in places very weedy, tangled with vines
Date April 24, 1947 Alt. 1200m. (estimated)
Coll. F.R. Fosberg No.

Remarks

1947 Cinchona Expedition

small
caulif
of w
to grow
shrub
spiral
leaves
shrub
herb
branch
consp
branch
yellow

suffrutescent, up to 1 m.
tall, flowers ~~orange-red~~
flowers whitish.

PLANTS OF COSTA RICA

Prov. de Alajuela

Det.

Locality

hills 2-3 km. south of SAN RAMON

Lat. 10°4-5'N., Long. 84°29'W.

Occurrence *occasional*

wet mossy or scarcely moist forest, logged out and
decadent, in places very weedy, tangled with vines

Date April 24, 1947 Alt. 1200m. (estimated)

Coll. F.R. Fosberg No.

Remarks

1947 Cinchona Expedition

PLANTS OF COSTA RICA

Prov. de Alajuela

Det.

Locality

hills 2-3 km. south of SAN RAMON

Lat. 10°4-5'N., Long. 84°29'W.

Occurrence *occasional*

wet mossy ~~or scarcely moist~~ forest, logged out and
decadent, in places very weedy, tangled with vines

Date April 24, 1947 Alt. 1200m. (estimated)

Coll. F.R. Fosberg No. 27353

Remarks *A. Brenes*
small tree 4m. tall;

ca

1947 Cinchona Expedition

PLANTS OF COSTA RICA

Prov. de Alajuela

Cinchona pubescens Vahl var.
Det. *F.R.F.*

Locality

hills 2-3 km. south of SAN RAMON

Lat. 10°4-5'N., Long. 84°29'W.

Occurrence *rare, one tree seen in*

wet mossy ~~or scarcely moist~~ forest, logged out and
decadent, in places very weedy, tangled with vines

Date April 24, 1947 Alt. 1200m. (estimated)

Coll. F.R. Fosberg No.

Remarks

1947 Cinchona Expedition

PLANTS OF COSTA RICA

Prov. de Alajuela

Faramea

Det.

Locality

hills 2-3 km. south of SAN RAMON

Lat. 10°4-5'N., Long. 84°29'S.

Occurrence *occasional in patch of*

wet mossy ~~or scarcely moist~~ forest, logged out and
decadent, in places very weedy, tangled with vines

Date April 24, 1947 Alt. 1200m. (estimated)

Coll. F.R. Fosberg No. 27361

Remarks *A. Brenes*
shrub 4m. tall;

f

1947 Cinchona Expedition

✓ 33
A. Brenes

Apr. 24 - hills ~~2~~ 3 km.
s. of San Ramón, Prov. Alajuela

wet mossy forest, logged
out and very decadent,
in places weedy 1200 m. e.

done
↓
27353

occasional

54 Piper

occasional

55 Piper

occasional

56 Costus

common

57 Polypodium

epiphytic on tree trunk

58 Cuphea infundibulata

common around edges of woods

59 Epidendrum

common, epiphytic on branches

10° 4' N
84° 29' W.

This is the place where, in 1921,
Alberto Brenes first found *Cinchona*
in Costa Rica. A search, in company
with Brenes, ~~for~~ failed to reveal any
remaining trees.

small tree 4 m. tall,
cauliflorous, racemes
of rose flowers along trunk
to ground.

shrub 2 m. tall,

spikes erect.

leaves stiff, spikes erect.

shrub 1.5 m. tall.

herb 1-2 m. tall, un-
branched, leaves in a
conspicuous spiral;
bracts red, flowers
yellow.

suffrutescent, up to 1 m.
tall, flowers ~~orange-red~~
flowers whitish.

✓ a. Brenner April 24 - hills 2 km. S. of
San Ramón, Prov. Alajuela

patch of scarcely moist
woods, tangled with
vines, on a steep slope. 1100 m. E.

27360 *Hamelia patens*
common

6 61 *Faramaea*
occasional

5 62 *Cinchona pubescens* Vahl var.
rare, one tree seen

✓ 65 April 25 - grounds of Instituto
Interamericana de Agricultura,
Turrialba
weeds along roadside

2 63 *Richardia*

64 *Boneria laevis* (Lam.) Griseb.

5 65 *Emilia javanica* (Burm.) Rob.

2 66 *Drymaria cordata* (L.) Willd.

↑

10°5' N.
84°27' W.

straggling shrub
up to 5 m. tall; flowers
red, buds orange.

shrub 4 m. tall,
flowers white, fragrant.
tree 3 m. tall, 2 dm. thick,
sterile, old leaves red,
leaves dull to sub-glossy
not very rugose.
(~~specimens from~~ sprouts from
base but 6 m. tall.)

9°55' N.
83°40' W.

532 m. (m.)

prostrate, flowers white.

erect, flowers white.

flowers red.

prostrate, cyms ascending.

April 26 - From the air the country south and west of Volcan Chiriqui looks densely forested, with many trees devoid of leaves at this season. Near the coast are large areas of mangrove swamp much of it with tall, almost leafless trees scattered abundantly in it.

✓ 70 April 26 David, Prov. de Chiriqui, Panamá
↓
weeds along roadside

27367 *Lantana camara* L.
occasional

3 68 *Scoparia dulcis* L.
common

69
common

70 *Gomphrena*
common

cultivated in park

71 *Jasminum*

72 *Pentas coccinea*

North of Puerto Armuelles is a large area cleared and apparently in bananas. From here to David are patches of cleared land.

8° 25' N
82° 27' W

shrub, 1 m. tall, stems square; flowers orange; fruit green.

— flowers pale greenish, 4-parted, hairy within, one anther reduced.

— prostrate, long stems from strong central root.

— prostrate from strong tap root; heads white.

— bush, 1 m. tall; flowers white.

— herb 0.8 m. tall; flowers crimson.

- ✓
27373 Hibiscus
cultivated in park

- 74
weed in roadside

- 75 Ixora
cultivated in garden

- 76
common in fence-rows,
probably planted as living post.

✓ April 27 - near the airport
km. 2. of David, Panamá
flat ^{grassy} plain with scattered
trees, mostly Anacardium
occidentale

- 77
roadside, on bare soil

- 78 ~~common~~
common along roadsides

- 79 Croton
occasional on

- 80
occasional on

shrub 1-1.5 m. tall, branching
sparse, virgate; flowers a
rich maroon, almost black
in center, closed in afternoon.

caespitose, somewhat
aromatic herb up to 1 m.
tall; flowers white.

small tree 4 m. tall,
flowers white, somewhat
fragrant; apparently
does not set fruit here.

straight tree with
strong leading shoot
and drooping branches;

caespitose, flowers
yellow, closed in afternoon.

flowers yellow.

27381 *Anacardium occidentale* L.
common in fence-rows and
scattered on plain.

4 82 *Richardia*
roadside

✓ April 28 - David, Chiriqui
gardens and roadsides

3 83 *Boerhavia*
roadside, common

1 84
climbing on fence around garden

4 85
tree growing in looryard

2 86 ~~*Boerhavia*~~
common tree in fence rows
and vacant lots

4 87
cultivated in garden

1 88 *Eryngium foetidum*
spontaneous in garden

tree 5 m. tall; flowers
yellowish, turning reddish.
fruit oblique with greatly
enlarged fleshy pedicel.
prostrate, spreading
from deep wing root,
flower white.

ascending from
prostrate base
herbaceous vine, flowers
whitish.

tree 5 m. tall, flowers
greenish.

tree 8 m. tall, ripe fruit
black with red receptacle.

shrub 1 m. tall, ~~as~~ with
straggly branches; flowers
bright yellow, petals thin.
herbage with a strong
unpleasant odor. "celintio"
used to flavor food.

April 24 - trip by road
from David to Panama City.

From David to somewhat
~~east~~ ^{east} of the eastern boundary
of Chiriqui Province the
vegetation is largely
a second-growth or cleared
wet forest, with *Cecropia*,
etc. In the region of the
Bocade Santiago are
extensive mangrove swamps.

As the road passes over
the range of hills just
west of Loma, the vegetation
changes to a scrubby
savanna, with legumes,
Byrsonima crassifolia, etc.
There are even large stretches
of grassland.

Just northeast of Bojeros
passing over another range
of hills, the road again
enters a rainy region of
wet forest.

May 3 - packed for
shipment, in pkgs. 2-7
all plants up to #27388.
pkgs. 2-6 sent with
green & orange tags to USNG
Hoboken, for forwarding to
Chicago Mus. #7 sent
directly to Chicago. Colls.
#27389-27394 to be dried
by Paul Allen and sent as
pkg. #8 to Chicago.

May 5 - flew from Panama
to Medellin - Pacific
Coast of Darien is a typical
sinking coast - dominated
by estuaries. Few settlements,
solid forest until obscured
by clouds in interior.
Country low, but with
long north-south(?) ridges.
Cavanillesia(?) very
abundant everywhere
except on some of the
ridges and in the mangrove
swamps.

1947 - Panama

half way between

✓ April 30 - Gamboa and Summit, C.Z.

27389 *Emilia sonchifolia*

✓ rare weed in crack in sidewalk

✓ May 4 - same

90

weed along roadside, common

✓ May 4 - Chiriqu Chiriqu Road,
4 mi. ^{n.e.} of Summit, C.Z.decadent forest, ~~is~~ rather
dry, with ~~is~~ sparse
undergrowth.5 91 ~~Mastrosorum~~
~~erect, side of ravine~~
~~shrub, sparsely~~6 92 *Mastrosorum glabrescens*
(Benth.) Wedd.
wooded slope

✓ May 4 - Madden Rd. 3 mi.

^{n.e.}
~~n.e.~~ of Summit, C.Z.second growth thickets
along roadside4 93 *Colubrina heteromeura* (Grisb.) Standl.5 94 *Godmania aesculifolia* (HBK.) Standl.

↑

(= Paul H. Allen #4492)

Canal Zone

79°40' W

9°5' N.

75 m.

flowers purple.

spikes erect, flowers
minute, purple.

79°35' W

9°5' N.

75 m.

shrub, sparsely branched
catkins pendent.small tree, 8 m. tall,
1.5 dm. thick.

79°38' W.

9°4' N.

75 m.

shrub 4 m. tall, leaves
very young.spreading tree 8 m. tall,
flowers yellow, with fine
purple punctations within on
all except the upper part of corolla.

* May 7 - Cartago
roadside

27395 Cordia

96 Rivina

97 Conyza bonariensis f. subliotheca Cuatr.
det. J. Cuatrecasas

98 Corchorus

99 *M. alba*?
cultivated in yard of dwelling
27400 Paspalum
principal grass in lawn
of plaza.

4 01 Stachytarpheta cayennensis (L.C. Rich) Vahl.
roadside det. Malderke

✓ May 9 - just below Saladito, on
Carretera del Mar, headwaters
of Rio Cali, 10 km. w.n.w. of Cali

1700 m.

brushy ravine on cleared slopes

occasional in brushy places
from here down to 1500 m.

shrub 1 m. tall, flowers whitish,
fruit red when ripe.

herb, flowers white, fruit red.

depressed, much branched
herb, branches erect; rays
dull white, disk yellow.

branched herb, branches
tending to be distichous,
flowers yellow.

tree 4 m. tall, petals yellow,
fruit immature.

flowering culms ascending
from prostrate superficial
rhizome.

branched herb, flowers
pale lavender.

3° 29' N

76° 35' W

tree 10 m. tall; leaves thick,
glossy, flower cream
white, turning dull tan,
with a fragrance like
very strong perfume, calyx
dehiscent even before anthesis; fruit immature

27403 *Galium hypocarpum* Benth.
in bush

✓ May 9 - Above Carmen

22
6600'

Cleared hills

10 04 *Cinchona pubescens* Vahl, var.
very common in fence rows
and persisting in cleared
pastures

11 05 *Cinchona* (Ladenbergia) *cuatrecasii*
↑ occasional in fence-rows

✓ May 9 - La Elsa, Quebrada
↓ La Cristalina

950-900 m.

thick tangled wet woods,
partly cleared.

5 06 *Labrua*
edge of woods

6 07 *Palicourea*
edge of woods

vine-like, fruit orange.

3°33' N

76°37' W

small tree 4 m. tall,
leaves dull, old ones turning
red; fruits not ripe, but
ones attached by insects
dehiscing.

rounded tree 7 m. tall,
fruit dry.

3°38' N

76°47' W

vine climbing in bush,
flowers pink.

shrub 3 m. tall. Thyrse
red-purple, turning greenish
purple, flowers purple,
fruit immature

- 27408 *Trichomanes elegans*
 deep wet forest
 09 *Jussiaea*
 common in deep wet forest

- 10 *Borreria*
 edge of grassy pasture
 common

- 11 *Drymaria cordata*
 common

- 12
 common in fence-row

- 13 *Peperomia*
 epiphytic on tree trunk in
 fence row.

- 14 *Ardisia*
 epiphytic on trunk of tree
 in fence-row.

- F.R.F.
 J. Cuatrecasas
 same May 11
 thick wet woods on top and
 sides of ridge 1100 m.

- 15 *Peperomia*
 climbing on tree trunk

- 16 *Gesneria*
 rare, climbing in bushes

- 17 *Burmeisteria*
 epiphytic, rare

fronds of a peculiar
 bluish green color.
 small slender tree
 5 m. tall, bark very bitter,
 fruit mostly immature

~~flowers~~ flowers white.

flowers white.

small tree 5 m. tall,
 flowers purple, ripe fruit
 black.

not especially fleshy,
 stems round below,
 square above.
 semi-scandent; spathe
 green, reflexed; fruit soft,
 lavender, translucent.

somewhat fleshy,
 clinging to
 vine, flower red.

shrub, flowers green

- 27418 *Asplenium*
in deep shade, terrestrial
19 parasitic on roots, steep slope

- 20 *Hoffmannia*
in open bottom of valley

- 21 common on top of ridge

- 22 *Vaccinium*
local on steep slopes

- 23 rare, epiphytic

- 24 *Weinmannia*

rhizome short, erect.

plants rose pink, head spheroid,
tessellate, plates with an
umbo more or less conic, and
striate, plates caducous
in age, leaving soft
pink hair-like processes
which later fall off.

leaving firm central
core showing somewhat
tessellate markings.

(2700')
330 m.
small sparsely branched
tree, branches leafy near
apex, cymes vermillion,
corolla vermillion with
yellow lobes; fruit immature.

leaves dark green above,
pale beneath; flowers white.

scrambling vine-like
shrubs, inflorescences
down to base, these vermillion,
corolla green with pale
to white tips.

flowers purplish

tree 7 m. tall, this
branch young, sterile.

- 27425 *Ladenbergia*
 26 *Elaeagia*
 very common on and near
 top of ridge all in flower,
 less common below
 27 *Cinchona* (*Ladenbergia*)
 common, especially on
 top of ridge
 28 *Psychotria*
 top of ridge
 29 *Peperomia*
 epiphytic on tree trunks
 on top of ridge
 30 *Miconia ternatifolia* Triana (det. Wurdack (1968))
 top of ridge
 31 *Besleria*
 top of ridge
 32 *Blakea podagrica* Triana (det. Wurdack (1968))
~~*Toproba*~~
 top of ridge, uncommon
 33 ~~*Psychotria*~~ *Palicourea*
 common in undergrowth
 34 *Palicourea*
 rare on ridge top

- seedling, 1 m. tall.
 tree 15 m. tall; flowers
 white, peculiarly fragrant.
 tree 5 m. tall, 7 cm. thick;
 flowers much larger
 fruit immature but
 probably full sized.
 ascending to erect in
 young.
 unbranched shrub
 1 m. tall, ripe fruit
 orange
 somewhat fleshy
 shrub 3 m. tall,
 fruits white.
 shrub with weak
 branches, flowers orange,
 succate, fruit spherical.
 shrub 3 m. tall; fruit
 rose pink
 shrub 1.5 m. tall,
 flowers whitish, fruit immature
 green with pale lines.
 shrub 4 m. tall, immature
 fruit blackish green, with
 pale lines, glossy.

27435

Bummeisteria

ridge top

36

steep slope

37

on steep slope

38

Dioscorea

on steep slope

39

Mangla

on steep slope

40

Psychotria

on steep slope

41

Clusia

epiphytic on very large tree

I

crater area
mailed
colombian
collections
to F.M. as
phyg. #9

May 13 Flight from Cali to
Ipiales.

In south. part of Cauca
Valley are dense patches
of Guadua.

East of Rio Cauca from
Santander south, and
south of it to divide south
of Popayan the country
is a rolling, dissected
plateau, mostly in
pasture, with thin
patches of woods here and there.

flower green

small tree, ~~flower~~ lactiferous,
flowers pale green, fruit
green

small tree, lactiferous,
buds only, leaf-buds curved.
slender vines.

vine, flowers white.

unbranched shrub,
flowers whitish.

♀ shrub, leaves leathery,
fruit immature.

at the divide,
south of Popayan, to
about La Union, the country
is made up of rugged
absolutely treeless hills
with thin grass and
very few inhabitants.

How such absolute denudation
could have been accomplished
by so few people is astonishing.
Perhaps a fundamental sterility
of the soil may have helped,
as M.A. Arroyo suggested.

May 14 - El Voladero, Páramo
del Angel, 10 km. n.e. of El Angel,
Prov. de Carchi

open páramo 3650-3700 m.
dominated by *Espelletia*

2-7442-

one of the dominant grasses

43 *Diplostephium glandulosum* Hieron. det. J. Cu
common

44 *Hedyotis*
common

45 *Espelletia hartwegii* Benth.
abundant, the dominant shrub

(photo on roll 7)

46 May 14 - Hacienda Chavallan, 4
just above El Angel, Prov. Carchi 77
weedy ditch banks and
road cuts 3730 m

46 *Festuca*
common weed

47 *Papaver*
common on cut banks

0°40' N
77°51' W

Cucumis branch purple

Di Cc Oc
Re Co Da
Re Co Da
Date
Coll. F.R. Fosberg
Remarks
No.
Alt.

Lat.

Occurrence

m. (estimated)

if limited, + all,
usually more toward
apical end of leaf.
stipules oblong to
ovate or ~~oblong~~
ovate-lanceolate, etc.
not strongly serrate
or acute.

branches firm,
with numerous
small

leaf surface
dull, each
sully glossy

3800
13 15200
1170

lactiferous, latex white,
buds nodding, petals maroon
with deep maroon spot at
base. "dormidero" or

Veins 8-10-12-(16)

lvs. obovate to
lance-obovate,
rarely broadly
lanceolate or elliptic
chartaceous

usually cuneate-attenu.
at base, rounded
or obtuse at apex,
rarely a tree with
pointed lvs.

Domatia usually
~~absent~~ present but
variable in distr.
occurring at all
or part of axils and
all or part of main (boles,

if limited, then
usually more toward
apical end of leaf.
stipules oblong to
ovate or ~~broad~~
ovate-lanceolate
not strongly cuneate
or acute.

branches firm,
with usually
small

leaf surface
dull, rarely
subglossy

3800
4
1315200
1120

PLANTS OF PERU

Dept. de Cajamarca

Locality _____ Det. _____

Lat. _____ ' S., Long. _____ Prov. de Celendin _____ ' W.

Occurrence _____

Date _____, 1947 Alt. _____ m. (estimated)

Coll. F.R. Fosberg No. _____

Remarks _____

1947 Cinchona Expedition

PLANTS OF PERU

Dept. de Cajamarca

Locality _____ Det. _____

Lat. _____ ' S., Long. _____ Prov. de Celendin _____ ' W.

Occurrence _____

Date _____, 1947 Alt. _____ m. (estimated)

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Remarks _____

1947 Cinchona Expedition

PLANTS OF PERU

Dept. de Cajamarca

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Lat. _____ ' S., Long. _____ Prov. de Celendin _____ ' W.

Occurrence _____

Date _____, 1947 Alt. _____ m. (estimated)

Coll. F.R. Fosberg No. _____

Remarks _____

1947 Cinchona Expedition

PLANTS OF PERU

Dept. de Cajamarca

Locality _____ Det. _____

drainage of Rio Limon
above Cortagana (Chimuch)
30-32 km. n.n.w. of CHLENDIN, Prov. de Celendin
Lat. 6°33'S., Long. 78°17-18' W.

Occurrence dense wet forest

Date July 2, 1947 Alt. 2300-2500m. (estimated)

Coll. F.R. Fosberg No. _____

Remarks _____

1947 Cinchona Expedition

PLANTS OF PERU

Dept. de Cajamarca

Locality _____ Det. _____

Lat. _____ ' S., Long. _____ Prov. de Celendin _____ ' W.

Occurrence _____

Date _____, 1947 Alt. _____ m. (estimated)

Coll. F.R. Fosberg No. _____

Remarks _____

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1947 Cinchona Expedition

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Dept. de Cajamarca

Locality _____ Det. _____

Lat. _____ ' S., Long. _____ Prov. de Celendin _____ ' W.

Occurrence _____

Date _____, 1947 Alt. _____ m. (estimated)

Coll. F.R. Fosberg No. _____

Remarks _____

1947 Cinchona Expedition

PLANTS OF PERU

Dept. de Cajamarca

Locality _____ Det. _____

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Lat. 6°33'S., Long. 78°17-18' W.

Occurrence dense wet forest

Date July 2, 1947 Alt. 2300-2500m. (estimated)

Coll. F.R. Fosberg No. _____

Remarks _____

1947 Cinchona Expedition

PLANTS OF PERU

Dept. de Cajamarca

Det.

Locality

drainage of Rio Limon

above Cortagana (Chimuch)

30-32 km. n.n.w. of CELLENDIN, Prov. de Celendin

Lat. 6°33'S., Long. 78°17-18' W.

Occurrence

dense wet forest

Date July 2, 1947 Alt. 2300-2500m. (estimated)

Coll. F.R. Fosberg No.

Remarks

1947 Cinchona Expedition

PLANTS OF PERU

Dept. de Cajamarca

Det.

Locality

drainage of Rio Limon

above Cortagana (Chimuch)

30-32 km. n.n.w. of CELLENDIN, Prov. de Celendin

Lat. 6°33'S., Long. 78°17-18' W.

Occurrence

dense wet forest

Date July 2, 1947 Alt. 2300-2500m. (estimated)

Coll. F.R. Fosberg No.

Remarks

1947 Cinchona Expedition

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one of the dominant grasses

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abundant, the dominant shrub
(photo on roll 7)

46

May 14 - Hacienda Chavallan,
just above El Angel, Prov. Carchi
weedy ditch banks and
road cuts 3730 m

46 *Festuca*
common weed

47 *Papaver*
common on cut banks

0°40' N

77°51' W

clumps, panicle purple

shrub less than 1 m. tall,
flowers lavender-pink.
forming mats and
cushions, flowers white
within, purple without.
leaves glistening, fleshy,
paler beneath. (note ~~are~~ apiculate
apices to leaves and pointed corolla lobes)
trunks 2 m. tall, leaves
in a single large rosette
at top, inflorescences
ascending, flowers yellow.

47° N

77°57' W.

lactiferous, latex white,
buds nodding, petals maroon
with deep maroon spot at
base. "dormidera" or

27443

Calceolaria

5

common

3

49

Yerba Solanum
occasional?

50

Spergula
common

May 14 - Drive from
Tulcan to Quito.

not far south of
El Angel, at middle
altitudes. *Hedyotis thymifolia*(?)
dominates certain over
grazed slopes. This
same vegetation is
found at various
places between here
and Quito.

At Ibarra in the plaza
is a tremendous old
balsa tree - *Ochroma*.
at 7500' alt.

herb up to 8 m. tall
flowers sulfur - yellow

branching, semi-prostrate
herb; flowers dull pinkish
with whitish margins
and sinuses; fruits green.
"yerba mora"

semi-decumbent herb
with somewhat fleshy leaves.

May 19 - Valley of Rio Papallacta north of Volcan Antisana ~~starts~~ starts at the Pass de Guamaní, at about 4000 m. In this pass there is open grassland with many páramo plants - a real flower-garden where not grazed by goats. Here and there are patches of low woods almost all of *Gynoxys* trees.

Going downward one finds subparamo-like brush, largely melastomes, etc., gradually changing to woods. From the village of Papallacta down the country is wooded. Just above Papallacta a lava flow, relatively recent, has dammed up the valley and caused Laguna de Papallacta, a sizeable body of water. The lava flow has a thin vegetation with a *Blechnum* (*Lomaria*) very prominent.

Below Papallacta the forest becomes tall, very wet. In the valley bottom *Alnus* is dominant down to 3000 m. or below. The sides have a mixed forest, with some melastomes, *Brunellia*, etc. but with a conspicuous scarcity of *Rubiaceae*. No *Linchome* seen.

(part. incorrect)
About half way to Cuzuja the Rio Papallacta is joined by the Rio Chalpi and becomes the Rio Quijos. There is some local dispute as to where the name R. Quijos is correctly applied.) The Rio Chalpi is larger than the R. Papallacta and enters from the north.

Cuzuja is said to be about half way bet. Papallacta and Baeza, and said to be about 2800 m. alt. It is a tiny village.

V 100
May 19 - Cuzuja, valley of
Rio ~~Guiza~~ Papallacta,

2800 m. e.

⑤ muddy trail side with running water.

27451

Drymaria

common in mud

52

Polygonum

occasional

53

Cardamine

common

54

Polygonum

common

55

Veronica

occasional

56

Nasturtium

occasional

57

Mimulus

occasional

58

Callitriche

abundant in water, emerging.

25° S

78° 1' W

recumbent, supported by other vegetation.

ascending from decumbent

base; flowers rose-pink.

erect, flowers white.

ascending from decumbent

base, flowers white to dull

pinkish. Not eaten by cattle

because of its pungent taste,

but occasionally by mules

ascending to erect; corolla

caducous in evening,

white.

erect, flowers small,

whitish.

erect plant succulent,

ascending from prostrate

base, corolla yellow, with

palate and lower side

of throat dotted with red,

throat ^{di} sulcate beneath.

plant strong enough

to support self.

27459

Eleocharis

5

common in mud

✓

40

Epilobium

↑

rare at edges of mud

✓ (13)

down
↓May 20 - Valley of Rio Papallacta
1-5 km. below Cuyuja

2600-2800 m.

cleared slopes and benches
with thickets and wooded
ravines

✓

61

Saurauia bullata Wawara
*Saurauia*common, persisting after
clearing

✓

62

Cordia

occasional

5

63

Solanum

occasional

5

64

Solanum

common

2

65

Graphalium

occasional

✓

66

Stellaria

common

✓

67

common

forming cushions.

erect from prostrate base;
flowers white.

26°S

78°W

small tree, others up to
10 m. tall or more; flowers
white, fruit eaten.small tree, others up to
10 m. tall; fls. whitish; bast
fiber used for rope-making.herb 1.5 m. tall; flowers
purplish green; leaves
very rugose; fruit immature.herb 1 m. tall, flowers
white.

heads rusty

flowers white

flowers yellow; said to be
an effective remedy for
toothache, much eaten by
cattle.

27463 *Drymaria ovata*
common

69 *Caieca*
common

2 70 *Cynoglossum*
occasional

~~71 *Caieca*~~

6 71 *Caieca*
common

5 72 *Barnadesia parviflora* Spruce det. J. Cuatrecasas
common both in open and
in thickets

gray-green, procumbent,
flowers white.

Tree up to 5 m. tall, simple
or branched candelabra
fashion, flowers green
almost sessile; fruits
below leaves, orange-yellow
when ripe, 5 ridged, pulp
around seeds edible, tart,
flesh watery, said to be
used for preserves, juice
makes lips sore.

(seed sample) (with #27471)

flowers blue

tree up to 5 m. tall, simple
or branched candelabra-fashion,
flowers green, paniculate,
leaves usually larger than
in this specimen. (with #27469)

tree 5 m. tall, others much
taller, trunk covered with
clusters of spines, branches
becoming less spiny,
ultimate flowering ones
spineless; flowers rose-
purple.

broken-down forest filled with
chusquea

27473 Hoffmannia
5 uncommon in ravines
and on steep slopes

2 74 Begonia urticae L.f. det. L.B. Smith
rare

5 75 Tragia
common in open places under
trees

5 76
common in open places under trees

1 77
rare in open places under trees

3 78 Peperomia
occasional on fallen tree trunks

1 79 Malaxis
rare, terrestrial

2 80 Sanicula
occasional in open spaces
under trees

1 81 Hedysmum
occasional

1 82 Pilea
common in open places under
trees.

sparsely branched shrub
2 m. tall; flowers yellow;
fruit immature.

herb up to 1 m. tall, stem
fleshy; flowers pink.
stem fleshy.

stems fleshy, reddish; leaves
green, without white markings
(with #27477)

stems fleshy, reddish; leaves
with hairs above with conspic-
uous white pustulate bases.
(with #27476)

more or less fleshy; used
to coagulate milk in cheese
making.

flowers greenish

small tree, fragrant
when broken; "granizo"
by more or less in one plane;
mostly sterile.

27482

epiphytic on tree trunk

deep wooded river ravine

7

34

bushy

common everywhere

5

85 *Vaccinium*

local, just above river

3

86 *Spigelia*

local on bench above river

1

87 *Phytolacca*

rare on bench above river

7

88 *Tournefortia*

common on benches above river

4

89 *Cestrum*

rare, just above river.

2

90

rare, just above river

flowers dull reddish-brown

forming tangled masses,
clambering in trees, stems
solid, up to 2.5 cm. thick;
only one plant seen in flower,
fertil & sterile specimens
~~pubes~~ ~~not necessarily~~ from same plant.

vine like, climbing in
bush, leaves arranged
distichously; corollas
white.

herb 1 m. tall, sparsely
branched, flowers deep
crimson-purple.

stems maroon, flowers
deep rose-pink; ~~the~~ fruit
said to be used to wash
clothes. "atuxara"

shrub 2 m. tall; flowers
pale green, fruits green.
shrub 2 m. tall, flowers
deep purple, without, green within;
fruit black.

vine, tangled in bushes;
fruit immature.

- 27491 *Pilea*
common in opening, under
trees
- 92 *Epiphyllum*
rare, on fallen tree
- cut banks and second-growth
thickets along trail.
- 93 *Polypodium*
pendent, from overgrown bank
- 94 *Galium*
~~earth banks~~ old tree trunks
- 95 *Stellaria*
earth, banks
- 96 *Liabum*
thicket
- 97 *Tournefortia*
common in thickets
- 98
common in woods and thickets
- 99 *Centropogon*
common in thickets

stems fleshy, flowers
whitish green.

flowers crimson-magenta,
column whitish.

rhizome creeping, fronds
stiff. "calaguala" used
to purify the blood.

prostrate, tangled,
climbing.

vine-like, tangled,
flowers white, petals
bifid.

scrambling herb, branched,
several m. long, definitely
lactiferous, flowers yellow.

shrub 2 m. tall, leaves
very rugose; flowers
purplish white.

scrambling vine-like
shrub, flowers pendent,
deep orange, paler at mouth,
said to contain sweet fluid
that is eaten.

scrambling shrub
corolla red with yellow lobes,
column white, anthers dark gray.

27500

Leadenia

2

thickets.

5

01

Fuchsia scabruscula Benth.

thickets, common

Dec. 15, 1947

1

02

Calceolium tuberosum

rare on bank

5

03

occasional, climbing in
small trees

1

04

*Oenothera*rare on trampled ~~to~~ grassy bank

2

05

Porteria

occasional

2

06

Borreria laevis

rare along trail

5

07

*Calceolium*common in thickets, (also
in pastures)

↑

r

J

May 21 - Cuzuja, valley of
Rio Papallacta.

©

along trail

08

Salvia

common

2800 m. (e)

25' S

78° 1' W.

vine-like, flowers
bright magenta-purple,
3-parted, petals equal,
broadly elliptic, acute.

scrambling shrub;

leaves, rigose; flowers

crimson

flowers deep purple
with yellow anthers.

vine-like, branched

petals red, yellow at
tips.

small tree, becoming

much larger, flowers

pale green. "lugma" fruit eaten.

flowers white

scrambling herb,
flowers yellow.shrub 2 m. tall, flowers
crimson.

bottom of ravine along
river

27509

Blechnum

occasional

4

10

Blechnum

common

6

11

Piper

occasional

6

12

Palicourea

occasional

pastures with thickets, not
far from river.

1

13

Nertera granadensis (L.f.) Druce
wet ⁱⁿ place among thickets,
rare.

5

14

Phyllanthus
occasional

5

15

common

rhizome short, erect, fertile
fronds erect, sterile, spreading.
rhizome erect, up to 3 dm.,
fertile fronds erect, sterile
spreading, tips prostrate
on ground, ~~to several~~ much
elongate, young fronds
reddish.

shrub 1.5 m. tall.

shrub 4 m. tall; thyrses
rose-purple, fruit immature.

prostrate; leaves crispate;
flowers pale green; fruits
deep red, translucent.

small tree 4 m. tall, with
single erect stem and
horizontal, deciduous
branchlets which simulate
compound leaves; flowers
pendent, reddish bronze.

small tree; fruit fleshy,
immature. "motilon" fruit
purple, edible when ripe.

27516

Tournefortia

7

rare

6

17

Tournefortia

occasional

3

18

rare, epiphytic on trees in thicket

6

19

Galium hypocarpium Benth.
rare, climbing in trees in thicket

6

20

Piper

occasional

steep very weedy corn-patch
in clearing in wet forest
on wall of valley.

2900 m.

> 3000 m

5

21

common

6

22

Solanum

rare

4

23

Oxalis

common weed

5

24

Stellaria media

common weed

shrub 4 m. tall, bushy;
flowers white, becoming
rusty.small spreading tree;
flowers white, becoming
rusty, unpleasantly fragrant.shrub; flowers white,
panicles very fragile.vine several m. long,
tangled; ~~petals~~ flowers
greenish; fruits orange,
fleshy, unusually large.erect shrub 2 m. tall;
leaves harsh; spikes erect.spreading extensive
herb; flowers and
bracts white.trailing herb, stems
elongate, no tubers found;
flowers white; fruit green,
ovoid.extensively creeping;
flowers yellow.prostrate, tangled;
~~the~~ petals white, bifid.

- 27525 *Laguna*
occasional
- 26 *Seymouria*
common in open ravine
- 27 *Galium*
occasional
- 28 *Solanum nigrum*
occasional
- 29 *Drymaria caovata*
common
- 30
common
- 31 south side of valley,
dense montane rain-forest
on steep slope, undergrowth
largely *Chusquea*. 2900-3000 m.
- 31 *Asplenium*
common, epiphytic and terrestrial
- 32
rare
- 33
epiphytic on liana, rare
- 34
climbing in trees
- 35
rare

- prostrate, tangled;
petals white, entire.
roots yellow; flowers
yellow.
- prostrate, roots yellow;
flowers reddish green.
weak herb, slender;
flowers white.
- elongate prostrate herb,
petals white, bifid,
shorter than sepals.
flowers deep orange-red.

- rhizome erect, several
dm. long.
- shrub up to 2 m. tall, weak;
calyx & pedicel red, corolla
yellow.
flowers white.

tangled liana

small shrub, leaves
pale beneath; calyx red,
corolla yellowish with
red ^{list} outside ^{above} ~~lower~~ ^{upper} half red.

- 27536 *Hoffmannia*
occasional
- 4 37 *Hedyosmum*
occasional on ridge ^{steep}
- 10 38
epiphytic in tree on ridge ^{steep}
- 1 39 *Asplenium*
occasional, terrestrial
- 5 40 *Peperomia*
common, terrestrial
- 2 41 *Peperomia*
occasional, epiphytic
on branch of tree
- 3 42 *Mikania*
common, ~~rare~~

This whole valley, from
Papallacta to at least 5 km.
below Cuyuja is cut in
beds of gneiss and schist.

The forests are relatively
dense and wet, and would
seem to be ideal for Rubiaceae,
but this family is almost
absent. Altogether we
saw one *Guettarda* (sterile, not
collected), which is occasional,
a single *Palicourea* which

shrub up to 2 m. tall;
flowers yellow, ripe fruit red.
shrub 3 m. tall, ♂
aromatic. "granizo."
liana-like shrub.

dark green

fleshy, rhizome
creeping, to several dm. long.
leaves pale beneath.

fleshy

liana, usually sterile.

was seen a few places near
the river, two *Galium*s which
are occasional, *Borreria laevis*
one plant seen, *Vertera*
granadensis, 2 small
colonies seen. The latter 2
are weedy in most places.

Weinmannia is seen
occasionally, but not
common, several species.
Melastomaceae common.

Valley of

May 22 - Rio Papallacta at
confluence of Rio Chalpi
6 km. below Papallacta

27543

*Drymaria*bare rocky trail across
river bed.

44

*Thalictrum*very common along trail
in edges of thickets

✓ 20

May 22 - Valley of Rio
Papallacta 5 km. below
Papallacta 49 km. e.s.e. of Quitosides of ravine cut by
small stream

s

45

Calceolaria

wet earth banks

s

46

*Geranium*common in dense weedy
growth along trail

s

47

*Tropaeolum*in dense weedy growth
along trail

s

48

Solanum nigrum

abundant in ravine along stream.

May 22 - Valley of Rio Papallacta
1 km below Papallacta
45 km e.s.e. Quito

Thickets of second growth along trail

50 km. e.s.e. Quito

27° S

78° 5' W

2900 m alt

flowers white

herb 1-2 m tall, . . . monocious
calyx glaucous purple,
stamens maroon

23° S

79° 6' W

2950 m alt

flowers yellow

vine-like, flowers
lavender-pink.great succulent-stemmed
herbs 1-2 m. tall; flowers

3100 m alt

27549

common climbing in trees

50

Centropogon
rareMay 22 - Papallacta,
valley of Rio Papallacta

44 km. e.s.e. Quito

cleared pasture-land
with brushy ravines
and fence-rows, gentle slopes.3
2

51

in fence-row

2

52

in fence row (with #27554)

2

53

Equisetum
on vertical earth bank,
common

54

common along fence-rows
(with #27552)

55

Miconia crocea (Desr.) Naud var. *setosa* Mgff.
(det. Wurdack (1968))
common in fence-rows

56

Barnadesia arborea HBK det. J. Cuatrecasas
dominant fence-row shrub

vine, flowers greenish.

scrambling shrub; corolla
orange-red with greenish-
yellow lobes; the only
other plant seen in the
vicinity had the same
elongate calyx lobes.

23'9

78° 8' W

3400 m. alt.

vine-like herb; flowers
greenish-white; fruit immature.
~~herb~~ herb 1 m. tall; flowers
salmon-red.herbs 1-1.5 m. tall; flowers
white with deep red center.shrub 1-3 m. tall; flowers
white; fruit purple.
shrub 2-3 m. tall very
spiny throughout; flowers
rose-pink.

- 27557 *Lepidocampylus*
common in fence-row

I

- ✓ (8)
27558 May 23 - Laguna Papallacta,
above Papallacta,

lava flow which blocks
valley to form lake; broken
lava blocks covered with a
blanket of mosses and
hepatics, with ferns,
orchids, dwarf shrubs,
a few larger shrubs, but
with no trees.

- 27558 *Blechnum*
dominant on steep slopes
at front of flow.

- 2 59 *Azorella*
scarce on steep slopes

- 2 60
common, ~~also~~ especially on
steep slopes, rhizome deep in cracks in

shrub 2 m. tall,
lactiferous; flowers
with corolla pale
green with bronze streak
outside on each lobe,
calyx bronze-purple;
♂ mature fruiting
pedicels deflexed.

- 23° 5'
78° 9' W.
3500 m. alt. On this lava flow,
surrounded by wet
forest, festooned with
moss, the vegetation
is essentially that of
the ~~dry~~ timber-line
region several hundred
m. above. The steep
slopes are dominated by
Blechnum aff. *arborescens*, but
this does not occur on the broken
but relatively level top of
the flow.

stem erect, up to 4 dm. tall,
~~sterile~~ ^{sterile} fronds ^{strongly} ascending,
fertile ones erect.
mat. forming

between
rocks.

2756 1

2

rare on steep slopes, rhizome
in cracks between rocks.

2

62 Gaultheria

rare

1

63 Hieracium

common (mostly with heads
abortive)

1

64

rare on steep slope

5

65 Pernettya

local

5

66 Lycopodium

rare, usually under
somewhat overhanging
rocks, growing out of crevices

2

67 Lycopodium

rare on steep slope

6

68 Diplostegium spinulosum Wedd.
det. J. Cuatrecasas

rare

2

69 Vaccinium

common, mostly sterile

4

70 Hymenophyllum

rare on overhanging rock

2

71 Pernettya

occasional

1

72 Miconia

common

1

73 Vaccinium

rare

fronds erect.

small shrub, fruit black

flowers yellow.

shrub up to 0.7 m. tall;
flowers white.
in clumps.

creeping.

bush 1 m. tall, rays white

shrub 1.5 m. tall, flowers
pink.

dwarf shrub; fruit pink.

strictly erect shrub 2 m.
tall; all sterile.

dwarf shrub; flowers
coral pink; fruit white.

- 27574 *Myrsine*
occasional
- 75 *Baccharis genistelloides* (Lam.) Pers.
common det. J. Cuatrecasas
- 76 *Zalium dryprocarpium*
rare
- 77 *Peperomia*
uncommon
- 78
rare, terrestrial
- 79 *Diplostegium hartwegii* Hieron.
occasional det. J. Cuatrecasas
- 80 *Vaccinium*
common
- 81
common, terrestrial
- 82 *Elaphoglossum*
common
- 83 *Berberis*
rare
- 84 *Elaphoglossum*
rare

- branching shrub, m.
tall; ripe fruit black.
mostly sterile; heads
whitish.
- wine, climbing in low bushes;
fruits fleshy, orange.
- (epiphytic on moss-covered
bushes,) erect, fleshy.
- erect, 1 m. tall, branched
at base and at top. flowers
waxy, white, outer segments
with maroon flecks outside,
odor musky, not very pleasant.
- shrub, m. tall; rays
deep lavender
- small shrub, fruit white,
translucent when ripe.
- flowers deep rose (mostly
not in flower).
- fronds erect, stiff.
- shrub 2-3 m. tall, very
gnarled and ragged, small
branchlets with leaves spinose;
leaves white beneath;
flowers orange-yellow
flushed with red.
- fronds erect, very brittle.

- 27585 *Claphroglossum*
occasional on rocks
- 5 86 *Pernettya*
common
- 5 87 *Hesperomeles*
common
- 2 88 *Muehlenbeckia*
occasional on flat rocks
- 5 89 *Polypodium*
common, terrestrial
- 2 90 *Hymenophyllum*
rare, under overhanging rocks
- 5 91 *Polypodium*
common
- 1 92 *Baccharis*
rare
- 2 93 *Pernettya*
common (prob. same as 27586)
- 5 94
common in deep moss
- 5 95 ~~*Cypripedium*~~
common on rocks

- shrub, leaves stiff, pale
beneath, veins pellucid;
berries white.
- depressed spring shrub;
fruit immature
forming cushions;
fruit black, fleshy when ripe.
rhizome creeping, glaucous.
- fronds erect
- shrub 0.7 m. tall; involucre
purple, flowers white
- small shrub; fruit
flushed with red.
- erect, flowers white
- flowers white.

✓ May 23 - Eastern slope of
 Paso de Guamani, headwaters
 of Rio Papallacta
 37 km. e. n.e. quite 3800 m.

open mountain meadow
 and walls of ravine

27596 *Bartsia*

5 common

2 97 *Jamesonia*

occasional on vertical banks

5 98 *Bartsia*

common

5 99 *Epilobium*

common along trail

2 27600 *Plantago*

occasional

3 01 *Valeriana*

occasional on vertical banks

1 02 *Ranunculus*

rare

3 03 *Nertera granadensis*

occasional on vertical banks

1 04

rare

~~same extensive range
 dominated by~~

6 05 *Senecio pimpinellifolius* HBK det J. Cuatrecasas
 on vertical banks, occasional

23° S
 78° 10' W

bracts purplish; corolla
 bright purple.
 fronds very erect.

bracts edged with purple;
 corolla pale green.
 tips nodding; flowers
 rose-purple.

slender small shrub;
 flowers purplish white.
 calyx deep bronze, corolla
 yellow.
 prostrate, flowers pale
 green, fruit red, rare.

~~3900 m.~~

leaves fleshy, rays bright
 butter-yellow.

- same - large marsh,
dominated by # 27611
- 27606 *Lycopodium*
common
- 07 *Alchemilla*
occasional
- 08 *Carex*
abundant
- 09 *Hypericum*
common
- 10 *Levesia chionogeton* Wedd. det. J. Cuatrecasas
rare, in marsh and above
- 11
abundant, dominant
- May 23 - Paso de Guamaní,
just ~~west~~ east of summit
- 4000 m
- small patch of forest,
mostly *Gynoxys* + #
- 12 *Lycopodium*
epiphytic on tree trunks
- 13 *Elaphoglossum*
epiphytic on tree trunks
- 14 *Gynoxys baccharoides* (HBK) Cass. det. J. Cuatrecasas
codominant tree in forest
- 15
codominant tree in forest

3900 m.

strictly erect, in clumps,
bronz-red.

caespitose, heads
nodding.
small shrub; flowers yellow.

heads greenish yellow

shrub up to 1 m. tall; branches
and leaves in one plane.

23° 5'
73° 10' W.

large mass, pendent;
leaves slightly pungent.

tree 3 dm. thick, 10 m. tall,
flowers yellow
tree 3 dm. thick, twisted,
10 m. tall, spikes pendent.

✓ May 23 - Paso de Guamani
just west of summit,
headwaters of quebrada de
Altocuchi, 35 km. e.s.e. Quito

4000 m.

typ. dense very wet forest, bases of
add. date tree trunks buried in
glacis great mass of moss
and tangled branches,
trunks very mossy.

27616 *Hesperomeles*
common

✓ 17 *Baccharis arbutifolia* (Lam.) Vahl
occasional det. J. Cuatrecasas

✓ 18 epiphytic on mossy tree trunks

~~18 epiphytic on mossy tree trunks~~

✓ 19 - rare, epiphytic on mossy tree trunks

✓ 20 ~~*Patagonia hypoleuca*~~
Rubus

✓ 21 epiphytic on mossy tree trunks

✓ 21 *Apium*
common, epiphytic and terrestrial

✓ 22 common, pendent from tree trunks

23° S
78° 11' W

tree 4 m. tall, flat-topped,
dark green, resembling
a conifer from a distance,
fruit reddish.

tree 5 m. tall, flat-topped,
dark green, resembling
a conifer from a distance.

flowers crimson

strong oily-celery odor.

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1947 Ecuador

27623 Polypodium

epiphytic on mossy tree trunk

24 Hymenophyllum

epiphytic on mossy tree trunk

25 Luzula

epiphytic on mossy tree trunk

May 23 - Valley of Rio
Papallacta just below
Laguna de Papallacta

Prov. Napo-Pastaza

3 26

abundant everywhere, this
specimen from pebbly dry stream bed

↑

Talking to several geolo-
gists, Walter Bauer, who
has a geologic map of
Ecuador, based on his
own investigations and
those of the oil companies
and such other sources
as available.

Schwemle,
chief geologist of Shell
Co., and Franklin Wallis,
mining engineer, I gather
that the structure of
eastern Ecuador consists

Pichincha - Napo-Pastaza 185

3450 - 24

prostrate, forming
mats; flowers white

of a tremendous fault,
running along the eastern
base of the Cordillera,
west of which has been
pushed up a tremendous
block running from
somewhere in Colombia
south through Ecuador,
with a difference of
many thousands of
feet. This exposure, on
the eastern slope, a great
area of metamorphic rocks,

schists and gneisses.

To the east this is deeply buried under at least 9 or 10 thousand feet of

sediments, running from at least Jurassic to Guatemalan.

The relationship is demonstrated by a remnant of the Cretaceous sediments persisting on top of the eastern Cordillera.

In Cretaceous time the Atlantic and Pacific approached to within 50 km. \pm of each other, but there was a strip of land corresponding more or less to the inter-Andine valley and the eastern Cordillera or part of it.

The absence of *Linchona* from the higher altitudes in the Cordillera Oriental north of Baños and perhaps the absence of *C. macrocalyx* var. *pitayensis* from the eastern slopes of Colombia (Cord. Central) may perhaps be explained on the basis of the metamorphic nature

of these regions:

Wallis says there schists would weather to a very sterile soil, low in Ca + K.

The actual volcanic slopes of Antisana and Lumbazo have not been explored for *Linchona*.

In southern Ecuador large areas are of Tertiary volcanic and intrusive material, but certain places, such as the Cordillera de Zamora, east of Loja, ~~Camacho~~ where *C. macrocalyx* is found, are metamorphic, acc. both Lauer and Wallis.

168

1947 Ecuador

x
done
↓

May 30 - Quito

weeds in garden

29627

Euphorbia peplus

very common

28

Cardamine

29

Veronica

30

Urtica urens L.

31

Galinsooga

32

Cotula

very common.

x

May 31 - Santa Rosa, on
railroad just south of
Quito, Prov. Pichincha
weedy railroad embankment

33

Cotula

common

34

grass

common

x

May 31 - Machachi railroad
station, Prov. Pichincha 3200 m.

x

35

Calceolaria

earth banks

x

May 31 - Chaupí (water tank),
south of Machachi, east of
Crazon Volcano, Prov. Pichincha
sparsely bushy mountain
meadow, sides of ravines

Pichincha

169

13' S

78° 30' W

petals minute, white.
recumbent, flowers lavender.leaves reddish-herbaceous
spreading.

16' S

78° 30' W

3000 m

large herb, flowers
yellow.spikelets purplish,
nodding.

30' S

78° 35' W

branched herb, sprawling;
flowers rich yellow.

32' S

78° 35' W

3400 m

(see p. 172)

May 31 - going south
from Quito the rr. climbed
up to perhaps 12000'
west of conazon Volcano.
There are great areas
of grass - the stiff bunch-
grass of the region, and
broken places with

sub-paramo-like brush.
McVaugh should compare
the tall cream-colored
Lophocampylus of the
western range and
valley with that of
the eastern (#27557) as
the one along the rr. is tomentose
or at least whitish pubescent
beneath and #27557 is
not. (?)

Area north of Ambato
is a rather barren volcanic
ash, eroded in places.

Behnia mollis is a very
prominent tree in bottom
lands along river. *Caesalpinia*
spinosa (?) common. Near
Ambato fruit trees are
planted in bottom lands.

Throughout region the
land is cut up into
small plots. These are
separated by rows of
Agave sp., *Opuntia*
(*Cylindropuntia*) sp., or
even *Puya* sp., and
Furcraea sp.

There is an appearance
everywhere of contour
planting. This seems to
be because the irrigation
practice which utilizes
furrows between the rows
thus



The main crops seem
to be *Vicia faba*, potatoes,
wheat and barley.

Little cultivation in the
higher areas, 3000 m. and
up. The valleys ^{of}
^{Sataungga,} near Ambato, and
especially Riobamba
are very intensively cultivated.

On Chimbrazo, grassy
vegetation seems to
go up clear to snow line,
15000-16000 ft.

27036 *Lupinus*
4 common

2 37 *Vicia*
common in hummocks
of other vegetation.

x May 31 - Dauli (flag stop)
on railroad, south east of
Cocayon Volcano, Prov. Pichincha
earth banks along railroad,
in mountain meadows

2 38 *Eupatorium*
common

1 39 *Alchemilla*
very common

1 40 *Galium*
in clumps of other vegetation

x May 31 - Lasso, north of
Latacunga, Prov. Leon

2 41 *Azorella*
climbing in bushes along
railroad

shrub 0.5 m. tall; flowers
violet, banner with
a white wedge which
later turns red-purple.
flowers violet, banner
most strongly so.

34' S
78°36' W
3300 m.

dwarf-shrub; head white.
prostrate

prostrate, fruit pale green.

54' S
78°38' W

lactiferous vine; flowers
purplish without,
dull whitish within.

✓

May 31 - Riobamba Prov. Chimborazo

weedy ground around
city water works, on top
of low hill, grazed by goats.

27642

Eragrostis

common

1

43

Nicotiana

on top of mud wall

3

44

Spartium junceum

thicket, probably planted

5

45

Verbena laciniata (L.) Big. det. M. D. D.

common in grassy places

2

46

Lippia nodiflora

common in grassy places

2

47

occasional

2

48

Nasturtium officinale R. Br.common
in trickle of overflow water

3

49

common

June 1 - From Riobamba
toward Guayaquil one
gradually climbs
through grain fields
to the altiplano south of
Chimborazo at ^{about} a little
~~3500~~ 3500 m. This is at about
the limit of cultivation

1° 40' S.
78° 38' W.

spreading tufts

spreading coarse herb,
flowers pale green.shrub 2-3 m. tall,
flowers bright yellow.prostrate; flowers
lavenderprostrate; flowers pale
lavender, calyxes maroon.

tufts

prostrate, stems succulent;
flowers white.tufts, culms erect or
ascending.

here, and one notices
grain growing in the
valleys surrounded
by grassy mountain
meadows. Just north
of Palmyra is a large
flat, probably an old
lake-bed, covered with

origin
of
ash
not
evident.

loose volcanic ash of
a dark blue-gray color.
This is dominated, where
there is any vegetation
at all, by Seneio sp.
with a scattering of
a stiff bunch-grass.
The bunch grass became
more dominant on the
low knolls and slopes
round about.

The Laguna de Colta
is being drained more
and more. The same close
turf dominates most
of the lake bed, but in
places a dense growth
of sedge may be seen.

Descending the Rio de
Alausi and the Rio Chancha
the grassland-vegetation
gives way to sparse
brush, cacti, Puya,
Tillandsia, etc., with
a small Fouquieria coming
in lower down. On the
gentler slopes this gives
way to pastures, corn
and grain fields.

Well below Sibambe
the brush begins to
get thicker and
below Huigra really
becomes forest, second
growth, of course.

Below Naranjato
the river levels out
and soon emerges
on the broad plain of
the Rio Guayas.

Near the railroad there
is no primary forest
left. Open pasture
and cultivated areas
alternate with small
patches of second-growth
woods - largely Cecropia
and Erythrina glauca.
The latter is also
used as a tree to
separate fields and
is the common shade-
tree for cacao, which
is commonly grown
here in the better
drained areas.

As the Rio Guayas
is approached

there are extensive areas of marsh, the less wet parts dominated by *Panicum maximum*, the wetter ones by a huge *Sagittaria* and a *Donax* or other sort of *Marantaceae*, both of these in flower at this season. Areas of water are filled by *Pistia* and *Salvinia*.

June 1 - Palmyra, Prov.

Chimborazo

3500 m. (est.)

beds of loose volcanic ash, dominated by this species

27650 *Senecio teretifolius* DC. det. J. Cuatrecasas
very abundant

June 1 - Tixán, Prov. Chimborazo
bottom of deep canyon

Salvia

common throughout region

June 1 - Sibambe, Prov.

Chimborazo

high or sparsely bushy steep canyon walls

In the broad estuary of the Rio Guayas are floating clumps of vegetation, mostly *Eichornia speciosa* (?).

In the highlands are several *Salvias* that would be good ornamentals - a deep blue, a red-maroon with whitish calyces, and a large scarlet.

low bushes; leaves terete, with a resinous odor; flowers yellow.

209' S
78° 42' W.

3000 m. (est.)

suffrutescent herb, ascending; flowers deep brilliant blue.

2500 m. (est.)

2° 15' S

78° 43' W

27652 Plantago

2 53 Drymaria

1 54 Muhlenbergia

3 55 Polypogon monnina speciosa Chat. det. Winters 1948

1 56 Cragrostis

June 1 Olimpo, between
Huigra and Naranjapata,
on Rio Chanchan just above
confluence of Rio Angas, Prov. Chimbo.
railroad cut in earth
banks.

57 Diastates
common

58

occasional

June 3 - Guayaquil

Left 2 boxes, one large,
the other small, of specimens,
marked #9 & #10, with
Sr. Varas, ~~at~~ agent of
the Estacion Experimental,
to be shipped by freight
to the Plant Quarantine
Station in Hoboken,
marked with their tags.
The boxes contain specimens

flowers white

flowers purplish, fruits
green, bordered with
bronze-pink.

2° 13' S

79° 2' W

flowers lavender

not caespitose

up to before #27626, but
with one fair press-
ful not included as
they were not yet dry.

June 4 - Between Puerto Bolivar and Machala are mangrove swamps and at least near the road they are mixed with a huge shrubby Salicornia or similar thing a meter or more tall. Also, a large Cereus may be seen mixed with the mangrove vegetation.

Between Machala and Santa Rosa is a rather variable bushy vegetation, with occasional marshy or swampy parts. The drier parts dominated by a yellow flowered Cordia, and various morning-glories.

The region has a diverse enough vegetation to make a collecting trip here eminently worth while. It should be made at this season as everything seems to be in flower.

Beyond Santa Rosa higher ground is reached and some rather dense woods, with large trees. Near Arenillas are extensive Typha marshes surrounded by woods.

Between Arenillas and the Peruvian border the country becomes drier. A bushy species of Ipomoea with large rose-purple flowers becomes the most abundant plant. There are a great number of other things in bloom. The country changes from a savanna-like brush to just plain brush, which becomes sparser. Not far from the border there is a small marsh which appeared from a fast moving truck to contain Anemopsis.

184

185



